

August 1, 2014  
W-P Project No. 12972A

Mr. James D Chaousis, II  
Town Manager  
1011 Wiscasset Road, PO Box 106  
Boothbay, Maine 04537

Subject: Mariner Tower Project  
Site Plan Peer Review

Dear Jim:

We have completed our peer review of the Mariner Tower site related items for the Boothbay Board of Appeals. The applicant has worked with us to fill the data gaps that were contained in the original submittal for the project and identified in our June 26, 2014 letter. This letter report presents the copies of the review letters provided by Wright-Pierce (Exhibit 1) and copies of the final documents associated with the various issues raised. A recap of various site related issues is presented below:

**Drainage Calculations:** The original application did not contain any information relative to a stormwater management plan for the site, although drainage features were identified on the site plans. A stormwater management report was submitted on July 18, 2014. AMEC on behalf of the applicant revised the stormwater management report based on the comments we provided to them. Changes were made in the watershed areas, and flow paths. In addition, the culvert across the site access road was upsized to 15-inch based on our review comments. The final stormwater report submitted on July 28, 2014 indicates a small increase in post development flows at the three analysis points presented in the report. The maximum increase is on the order of 0.5 cubic feet per second (CFS), which is not considered significant. An email message from AMEC documents the reduction in watershed areas is based on field reconnaissance. The final drainage information is contained in Exhibit 2.

**Wetlands Delineation Report:** While wetlands were indicted on the plans, a wetland delineation report was not submitted with the original application. The wetlands delineation report was received on July 9, 2014, and provided here as Exhibit 3. The report completed by AMEC indicated a potential vernal pool on the site. Further monitoring of the pool per Department of Environmental Protection protocols determined that this site was not a significant vernal pool. In addition, no rare, threatened, or endangered species were identified on the site.

**Generator Information:** While a generator was indicted on the site plans in the original submittal packet, specific details on the proposed generator were not provided. This information was received on July 15, 2014. The proposed generator is a propane fired 50 kW unit with a steel enclosure. The manufacturer's data indicated a noise level of 71 dbA at 23-feet from the unit. The equipment sheets provided for the proposed generator is presented in Exhibit 4.



Ms. James Chaousis, Town Manager  
August 1, 2014  
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Equipment Shelter: In the original application, an equipment shelter was indicated on the plan set without specific details as to the type of shelter to be supplied. Information for the shelter was received on July 15, 2014 indicating a pre-fabricated unit from CellXion would be provided. Subsequent conversations with the applicant, indicates a type H-1 unit would be provided which matches the configuration provided on the site plans. This information is contained in Exhibit 5.

Two conference calls were held after the Board of Appeals meeting on July 22, 2014. These calls were held to discuss the various issues associated with the cell tower data. The results of this portion of the peer review will be summarized under separate cover. We should note that the coverage maps provided for the various scenarios with the original submittal appear to be accurate and in order.

We look forward to discussing this project with the Board at the August 12, 2014 meeting. Let us know if there are any questions in review of our peer review.

Very truly yours,

WRIGHT-PIERCE

A handwritten signature in black ink, appearing to read "Jeffrey D. Preble". The signature is fluid and cursive, with a long horizontal stroke extending to the right.

Jeffrey D. Preble, PE  
Senior Project Manager

Enclosures

## Exhibits:

Exhibit 1: Wright-Pierce Review letters

Exhibit 2: Stormwater Management Report

Exhibit 3: Wetlands Delineation Report

Exhibit 4: Generator Equipment Data

Exhibit 5: Equipment Shelter Data

EXHIBIT 1  
Wright-Pierce Review Letters

June 26, 2014  
W-P Project No. 12972A

Mr. James D Chaousis, II  
Town Manager  
1011 Wiscasset Road, PO Box 106  
Boothbay, Maine 04537

Subject: Mariner Tower Project Review

Dear Jim:

We have completed an initial review of the materials submitted in support of the Mariner Tower application for a 120-foot monopole tower located off Ocean Point Road. The materials as submitted do not provide enough background information to complete a thorough review of the application at this time. In order to complete a thorough review we will need the following items:

- Drainage calculations to support sizing of roadside ditches, riprap aprons, and cross culverts, as well as assessing pre and post development runoff impacts.
- Copy of the wetlands delineation report.
- Information for the proposed generator to be constructed at the site, including size rating, fuel type, and whether any special options are being proposed such as weather or sound proof enclosures.
- Information for the proposed equipment shelter to be constructed at the site.
- A list of assumptions used for development of the radio frequency engineering studies, report, and model.
- A summary of the empirical data obtained from field measurements used to adjust the model.

Once we receive the additional back up information we will be able to provide additional feedback on the application. Let us know if there are any questions.

Very truly yours,

WRIGHT-PIERCE



Jeffrey D. Preble, PE  
Senior Project Manager

July 17, 2014  
W-P Project No. 12972A

Mr. James D Chaousis, II  
Town Manager  
1011 Wiscasset Road, PO Box 106  
Boothbay, Maine 04537

Subject: Mariner Tower Project Review

Dear Jim:

Since our June 26<sup>th</sup> letter we have received some additional materials in support of the Mariner Tower application for a 120-foot monopole tower located off Ocean Point Road. Items submitted or clarified are indicated below after each of the bullet points in *italic* font.

- Drainage calculations to support sizing of roadside ditches, riprap aprons, and cross culverts, as well as assessing pre and post development runoff impacts. *WP has not received back up documentation to support the drainage features shown on the drawings.*
- Copy of the wetlands delineation report. *Received on July 9, 2014 via email from Jonathan Springer. A potential Vernal Pool was identified on the site, and subsequent monitoring suggests the pool is not a significant vernal pool or contains any rare, threatened, or endangered species.*
- Information for the proposed generator to be constructed at the site, including size rating, fuel type, and whether any special options are being proposed such as weather or sound proof enclosures. *The generator was received via email on July 15, 2014 from Jonathan Springer. The generator is a propane-fired 50 KW unit that has a steel enclosure. Sound rating for this unit is 71 dbA at 23 feet.*
- Information for the proposed equipment shelter to be constructed at the site. *The equipment shelter building is a pre-fabricated unit supplied by CellXion. The material submitted for this application is general in nature and is not specific to this project. The information shows different shelter layouts and generator types depending on the application. Specific information should be submitted for this application.*
- A list of assumptions used for development of the radio frequency engineering studies, report, and model. *Some specific data was received on July 15, 2014 via email from Jonathan Springer. Our instrumentation engineer has not been available to review this information yet.*
- A summary of the empirical data obtained from field measurements used to adjust the model. *Based on the July 9, 2014 email message from Jonathan Springer, the adjustments to the model are completed at a national level and are likely proprietary information. This data will not be available.*

As additional information on the application is received, we will promptly take a look and provide our feedback. As an FYI, I will be out of the office on July 18<sup>th</sup> and returning Monday the 21<sup>st</sup>.



Ms. James Chaousis, Town Manager  
July 17, 2014  
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Let us know if there are any questions.

Very truly yours,

WRIGHT-PIERCE

A handwritten signature in black ink, appearing to read "Jeffrey D. Preble", written over the printed name.

Jeffrey D. Preble, PE  
Senior Project Manager

July 22, 2014  
W-P Project No. 12972A

Mr. James D Chaousis, II  
Town Manager  
1011 Wiscasset Road, PO Box 106  
Boothbay, Maine 04537

Subject: Mariner Tower Project Review

Dear Jim:

In preparation for the tonight's Boothbay Board of Appeals meeting for the Mariner Tower application for a 120-foot monopole tower located off Ocean Point Road, the following summarizes the status of the peer review.

- Drainage calculations have been submitted along with some follow up documentation to better correlate the calculations with the pre and post development watershed maps. Based on this additional documentation, we offer the following comments (note that these items were provided to AMEC earlier today via email). Based on my conversation with Caitlyn Abbott from AMEC this afternoon, we expect to receive the revised drainage calculations tomorrow morning. These minor issues should not affect the completeness of the application.
  - The flow paths identified for subcatchment S3 in the pre-development condition and subcatchments S3/S4 in the post development condition need to be extended to the furthest point in their respective watershed.
  - From the submitted calculations, the proposed 12-inch culvert appears to be flowing full under the 25 year storm event. We suggest that consideration be given to increasing the size of this culvert to account for the changes in the flow paths noted above and any accumulation of debris over time.
  - The maximum headwater elevation at the culvert inlet should also be checked against the grading of the gravel parking area to ensure this area does not overtop during a storm event.
- Follow up correspondence from Jon Springer was received on July 18<sup>th</sup> via email discussing the proposed plans for the equipment shelter at the site. While there may be a few details in coordination with what is shown on the AMEC plans and the equipment cut sheets for both the generator and the shelter, we feel this should not be an issue with respect to completeness of the application.
- A spreadsheet was received from Jon Springer on July 15<sup>th</sup> which details the Spaulding site and also the Bigelow and Spyglass Hill sites. The information also lists the propagation model for the sites used to prepare the RF plots. The information submitted appears to be in order, but any assumptions used in the development of the model have not been received. Information with respect to the empirical data referenced in our Jun 26<sup>th</sup> letter has been addressed.



Ms. James Chaousis, Town Manager  
July 22, 2014  
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We have also reviewed the list of questions from the Board of Appeals from June 4, 2014. The Board had requested information on the highest point of land in the special residential district and the restricted area of Ocean Point. In addition the Board requested information regarding the highest point of land on Ocean Point or East Boothbay. These elevations and distances are detailed on the enclosed figure. Information with respect to the proposed generator has been submitted and provided to the Town. There are several comments and questions regarding tower placement, use of additional sites, and alternate technologies that warrant further discussion between the Town, the Applicant and Wright-Pierce. We do not have adequate information to offer comments on any of the scenarios at this time.

Based on all of the information received to date with this application, we feel the application can be found as complete and a public hearing scheduled. We would suggest that a conference call or meeting be arranged prior to the public hearing between the Town, applicant and Wright-Pierce to review the tower placement and alternate site scenarios.

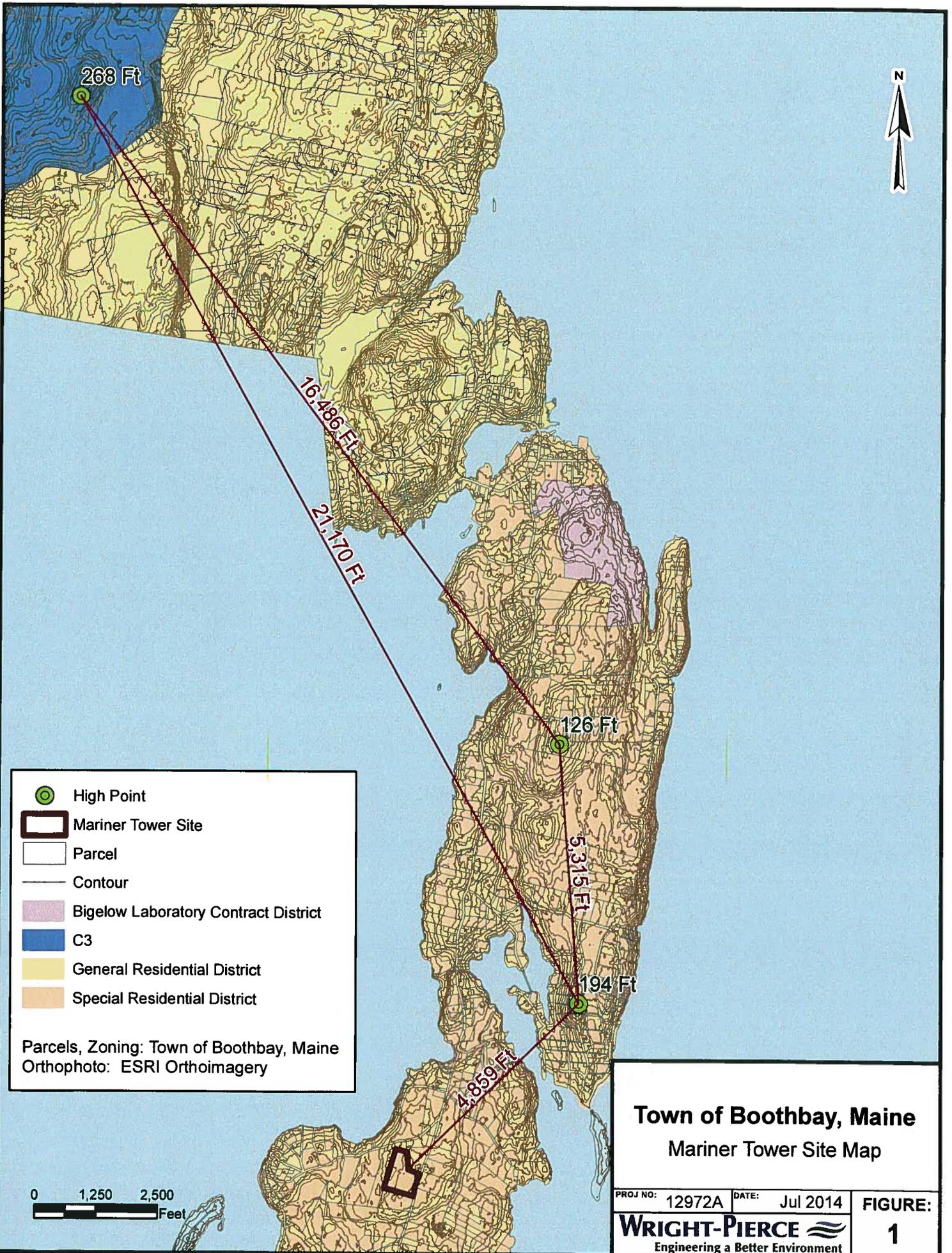
Let us know if there are any questions.

Very truly yours,

WRIGHT-PIERCE

Jeffrey D. Preble, PE  
Senior Project Manager

Enclosure



W:\GIS\_Development\Projects\ME\_Boothbay\12972A\MXDs\MarinerTower\_8x11.mxd

- High Point
- Mariner Tower Site
- Parcel
- Contour
- Bigelow Laboratory Contract District
- C3
- General Residential District
- Special Residential District

Parcels, Zoning: Town of Boothbay, Maine  
 Orthophoto: ESRI Orthoimagery

**Town of Boothbay, Maine**  
 Mariner Tower Site Map

PROJ NO: 12972A	DATE: Jul 2014	FIGURE:
<b>WRIGHT-PIERCE</b>		<b>1</b>
Engineering a Better Environment		

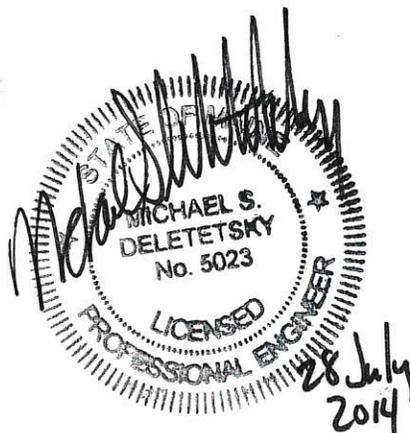
EXHIBIT 2  
Stormwater Management Final Report

# STORMWATER MANAGEMENT REPORT

Boothbay – Ocean Point Road  
Boothbay, Maine

Prepared for  
**MARINER TOWER**

Prepared by



**amec** 

511 Congress St.  
Portland, Maine 04101

July 18, 2014  
Revised July 28, 2014



## Boothbay – Ocean Point Road STORMWATER MANAGEMENT REPORT

AMEC Environment & Infrastructure, Inc. (Amec E&I), has completed the design for a cellular communication tower in the Town of Boothbay, Maine on behalf of Mariner Tower. This project has been designed to minimize the post-development flow rates in an attempt to prevent the transport of sediment due to erosion off site. The HydroCAD calculations in this report are based on rainfall data from the Northeast Regional Climate Center (NRCC). The following table summarizes the pre and post development peak flows for the 2-, 10-, and 25-year Type III 24-hour rainfall event:

24 Hour, Type III Rainfall Event			
	2 Year Pre/Post	10 Year Pre/Post	25 Year Pre/Post
Analysis Point 1 (AP-1)	0.60 cfs / 0.91 cfs	1.24 cfs / 1.84 cfs	1.55 cfs / 2.29 cfs
Analysis Point 2 (AP-2)	0.06 cfs / 0.20 cfs	0.12 cfs / 0.39 cfs	0.16 cfs / 0.49 cfs
Analysis Point 3 (AP-3)	0.88 cfs / 1.15 cfs	1.86 cfs / 2.29 cfs	2.35 cfs / 2.85 cfs

### Conclusion

The results of this report indicate that there is an increase in runoff in post development. The average increase of runoff in the three analysis point areas from pre development to post development during a 25-year rainfall event is 0.52 cubic feet per second. The site currently consists of a heavily wooded area. The drainage analysis incorporates a 2.145 acre area where 0.354 acres of good grass cover and 0.33 acres of gravel road surfaces are now proposed. The remainder of the site will remain heavily wooded. The culvert has been adequately sized, as shown in the attached HydroCAD calculations, to handle a 25-year rainfall event without overtopping the road.

The planning, layout, site drainage, and designs utilized within this project were done keeping in mind the Town's requirements in the development of the proposed telecommunication tower compound and access. The Site was reviewed for any signs of steep slopes, ledge, or wetlands/ vernal pools that may be impacted with this development and it was found that this Site fits with the surrounding area and should not overburden this large parcel.



## References

"Web Soil Survey ." *Web Soil Survey*. USDA National Resources Conservation Service, n.d. Web. 17 July. 2014. <<http://websoilsurvey.nrcs.usda.gov/app/wedsoilsurvey.aspx>

HydroCAD . Version 10.00. Software. HydroCAD Software Solutions LLC, 2011



## Pre Development



Flow to Vernal Pool



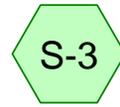
Analysis Point 1



Flow to offsite



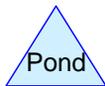
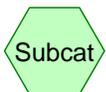
Analysis Point 2



Flow to offsite



Analysis Point 3



# Boothbay Pre Development - 072714

Prepared by AMEC

HydroCAD® 10.00 s/n 00629 © 2011 HydroCAD Software Solutions LLC

Printed 7/28/2014

Page 2

## Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
2.074	79	Woods, Fair, HSG D (S-1, S-2, S-3)
0.071	98	Water Surface, 0% imp, HSG D (S-1)
<b>2.145</b>	<b>80</b>	<b>TOTAL AREA</b>

# Boothbay Pre Development - 072714

Prepared by AMEC

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Page 3

## Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
0.000	HSG C	
2.145	HSG D	S-1, S-2, S-3
0.000	Other	
<b>2.145</b>		<b>TOTAL AREA</b>

# Boothbay Pre Development - 072714

Prepared by AMEC

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Page 4

## Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.000	2.074	0.000	2.074	Woods, Fair	S-1, S-2, S-3
0.000	0.000	0.000	0.071	0.000	0.071	Water Surface, 0% imp	S-1
<b>0.000</b>	<b>0.000</b>	<b>0.000</b>	<b>2.145</b>	<b>0.000</b>	<b>2.145</b>	<b>TOTAL AREA</b>	

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points

Runoff by SCS TR-20 method, UH=SCS

Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

**Subcatchment S-1: Flow to Vernal Pool**      Runoff Area=41,056 sf   0.00% Impervious   Runoff Depth>1.07"  
Flow Length=288'   Tc=43.3 min   CN=80   Runoff=0.60 cfs   0.084 af

**Subcatchment S-2: Flow to offsite**      Runoff Area=3,465 sf   0.00% Impervious   Runoff Depth>1.02"  
Flow Length=152'   Slope=0.0270 '/'   Tc=28.0 min   CN=79   Runoff=0.06 cfs   0.007 af

**Subcatchment S-3: Flow to offsite**      Runoff Area=48,900 sf   0.00% Impervious   Runoff Depth>1.02"  
Flow Length=324'   Tc=24.4 min   CN=79   Runoff=0.88 cfs   0.095 af

**Reach AP-1: Analysis Point 1**      Inflow=0.60 cfs   0.084 af  
Outflow=0.60 cfs   0.084 af

**Reach AP-2: Analysis Point 2**      Inflow=0.06 cfs   0.007 af  
Outflow=0.06 cfs   0.007 af

**Reach AP-3: Analysis Point 3**      Inflow=0.88 cfs   0.095 af  
Outflow=0.88 cfs   0.095 af

**Total Runoff Area = 2.145 ac   Runoff Volume = 0.186 af   Average Runoff Depth = 1.04"**  
**100.00% Pervious = 2.145 ac   0.00% Impervious = 0.000 ac**

**Summary for Subcatchment S-1: Flow to Vernal Pool**

Runoff = 0.60 cfs @ 12.63 hrs, Volume= 0.084 af, Depth> 1.07"

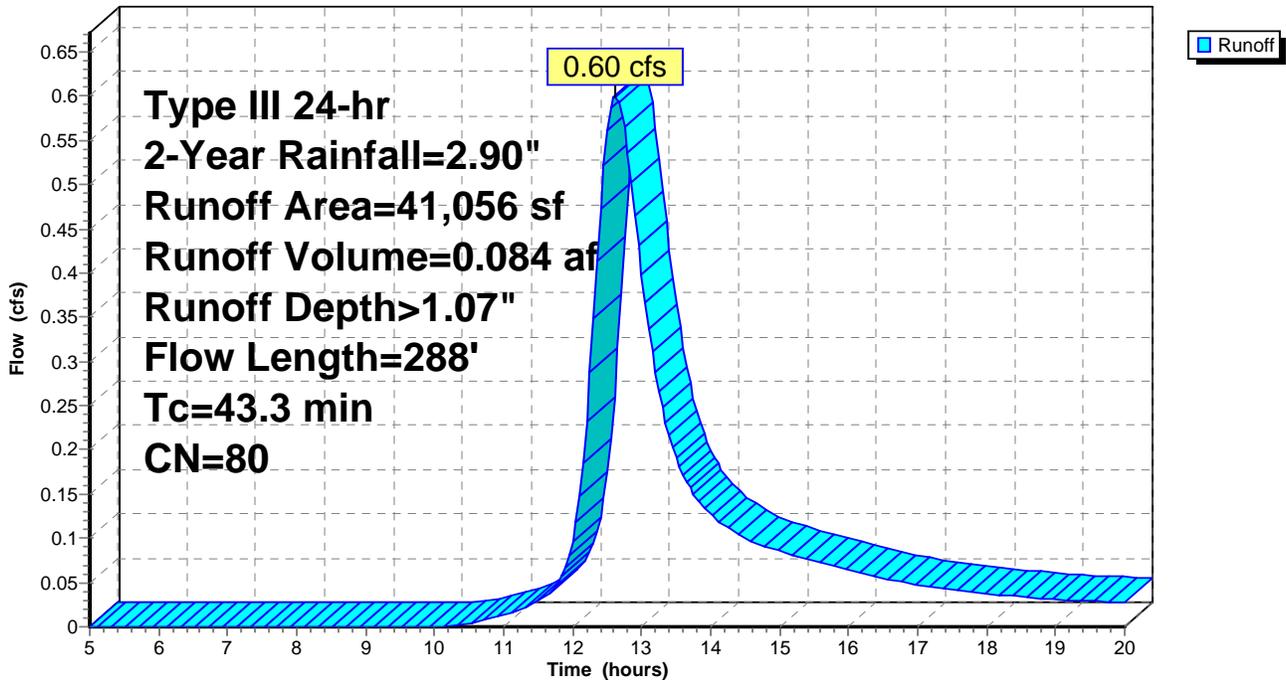
Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Type III 24-hr 2-Year Rainfall=2.90"

Area (sf)	CN	Description
37,957	79	Woods, Fair, HSG D
3,099	98	Water Surface, 0% imp, HSG D
41,056	80	Weighted Average
41,056		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
41.2	150	0.0100	0.06		<b>Sheet Flow, Woods</b> Woods: Light underbrush n= 0.400 P2= 2.90"
2.1	138	0.0500	1.12		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
43.3	288	Total			

**Subcatchment S-1: Flow to Vernal Pool**

Hydrograph



**Summary for Subcatchment S-2: Flow to offsite**

Runoff = 0.06 cfs @ 12.41 hrs, Volume= 0.007 af, Depth> 1.02"

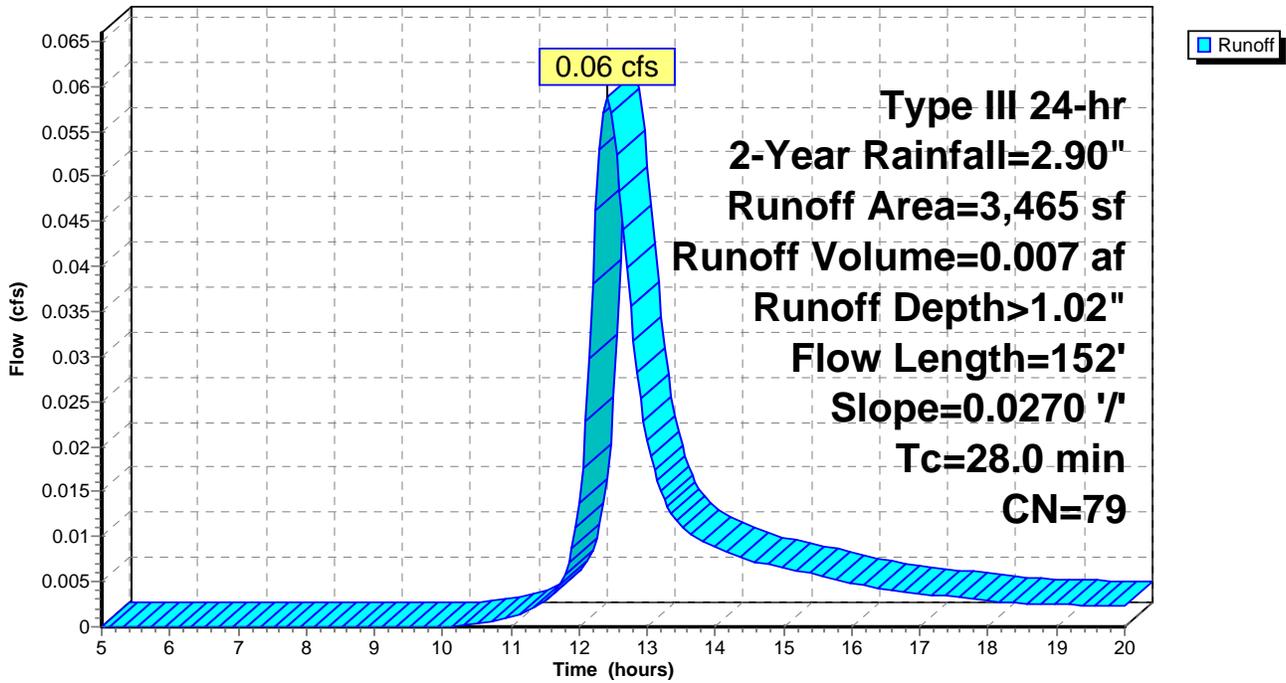
Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Type III 24-hr 2-Year Rainfall=2.90"

Area (sf)	CN	Description
3,465	79	Woods, Fair, HSG D
3,465		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.0	152	0.0270	0.09		<b>Sheet Flow, Woods</b> Woods: Light underbrush n= 0.400 P2= 2.90"

**Subcatchment S-2: Flow to offsite**

Hydrograph



**Summary for Subcatchment S-3: Flow to offsite**

Runoff = 0.88 cfs @ 12.36 hrs, Volume= 0.095 af, Depth> 1.02"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Type III 24-hr 2-Year Rainfall=2.90"

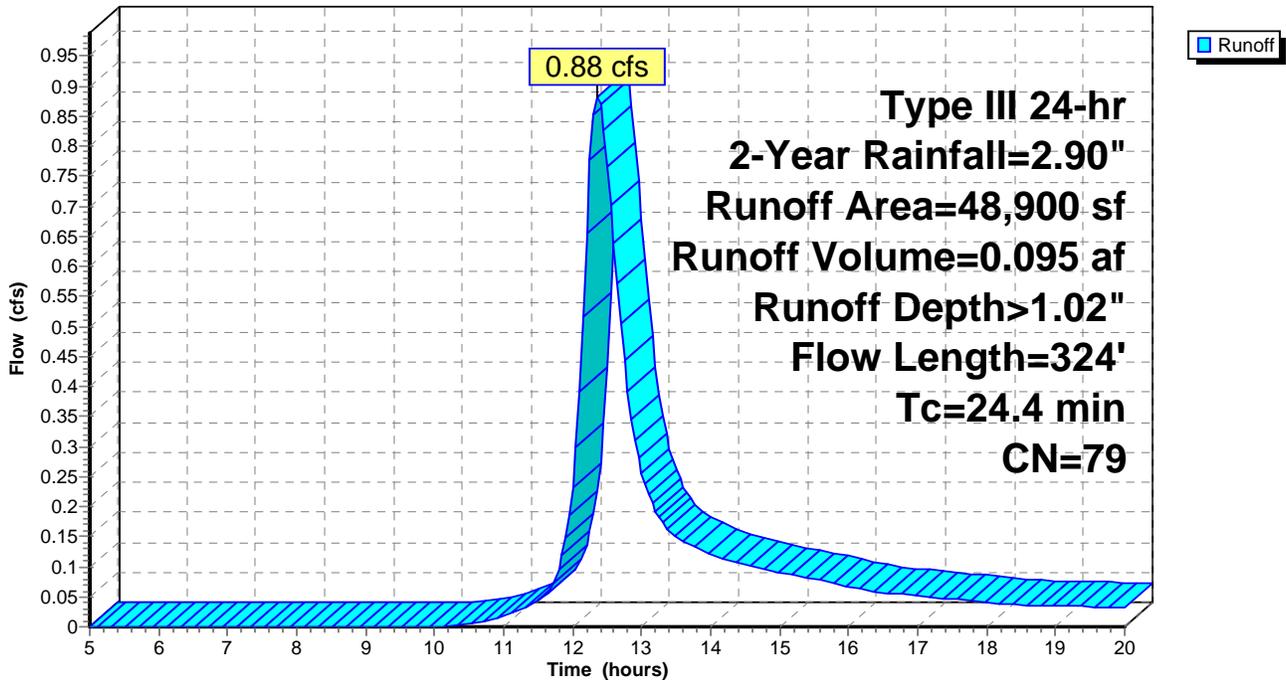
Area (sf)	CN	Description
48,900	79	Woods, Fair, HSG D
48,900		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.6	150	0.0500	0.12		<b>Sheet Flow, Woods</b> Woods: Light underbrush n= 0.400 P2= 2.90"
0.6	59	0.1250	1.77		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
2.2	115	0.0300	0.87		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
24.4	324	Total			

**Subcatchment S-3: Flow to offsite**

Hydrograph



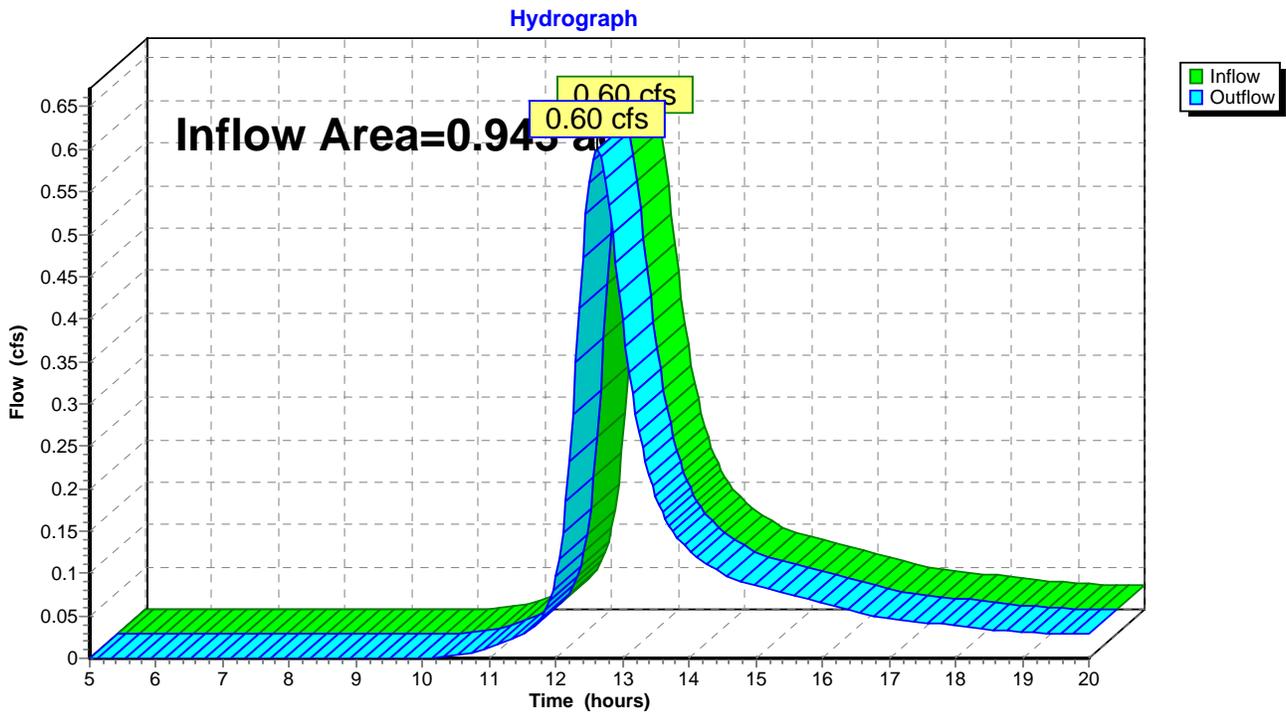
### Summary for Reach AP-1: Analysis Point 1

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.943 ac, 0.00% Impervious, Inflow Depth > 1.07" for 2-Year event  
Inflow = 0.60 cfs @ 12.63 hrs, Volume= 0.084 af  
Outflow = 0.60 cfs @ 12.63 hrs, Volume= 0.084 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

### Reach AP-1: Analysis Point 1



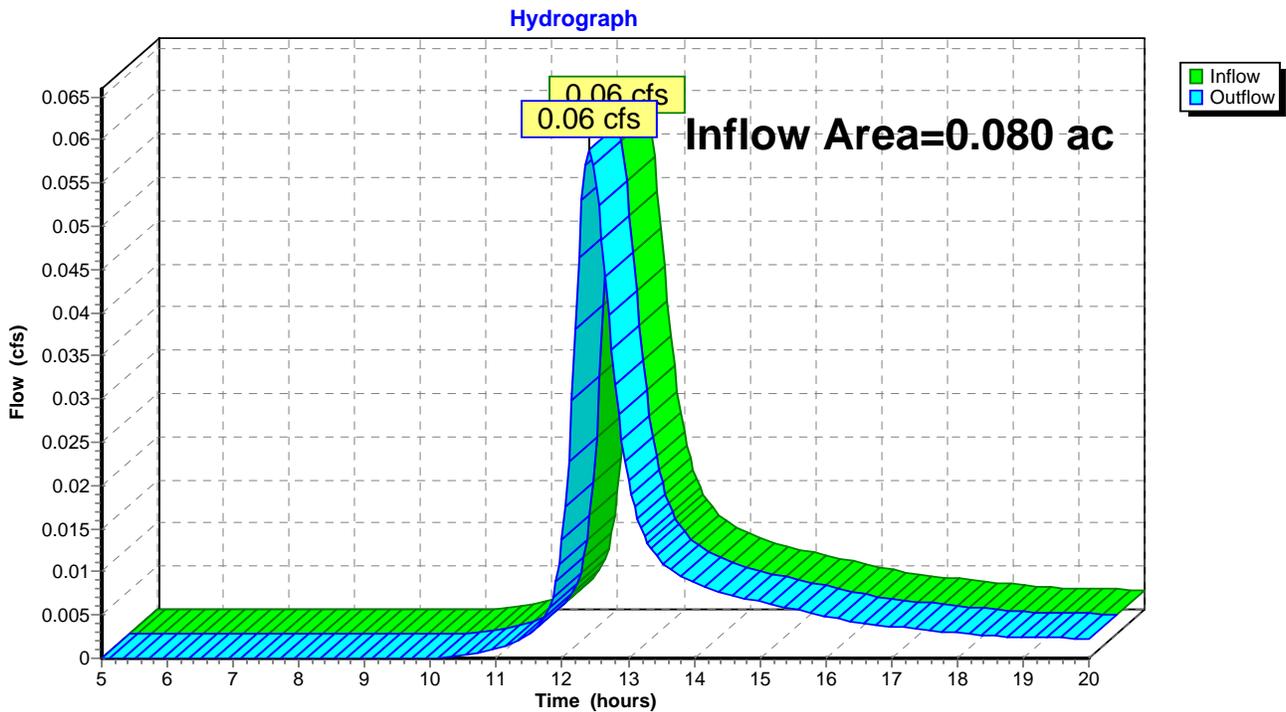
### Summary for Reach AP-2: Analysis Point 2

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.080 ac, 0.00% Impervious, Inflow Depth > 1.02" for 2-Year event  
Inflow = 0.06 cfs @ 12.41 hrs, Volume= 0.007 af  
Outflow = 0.06 cfs @ 12.41 hrs, Volume= 0.007 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

### Reach AP-2: Analysis Point 2



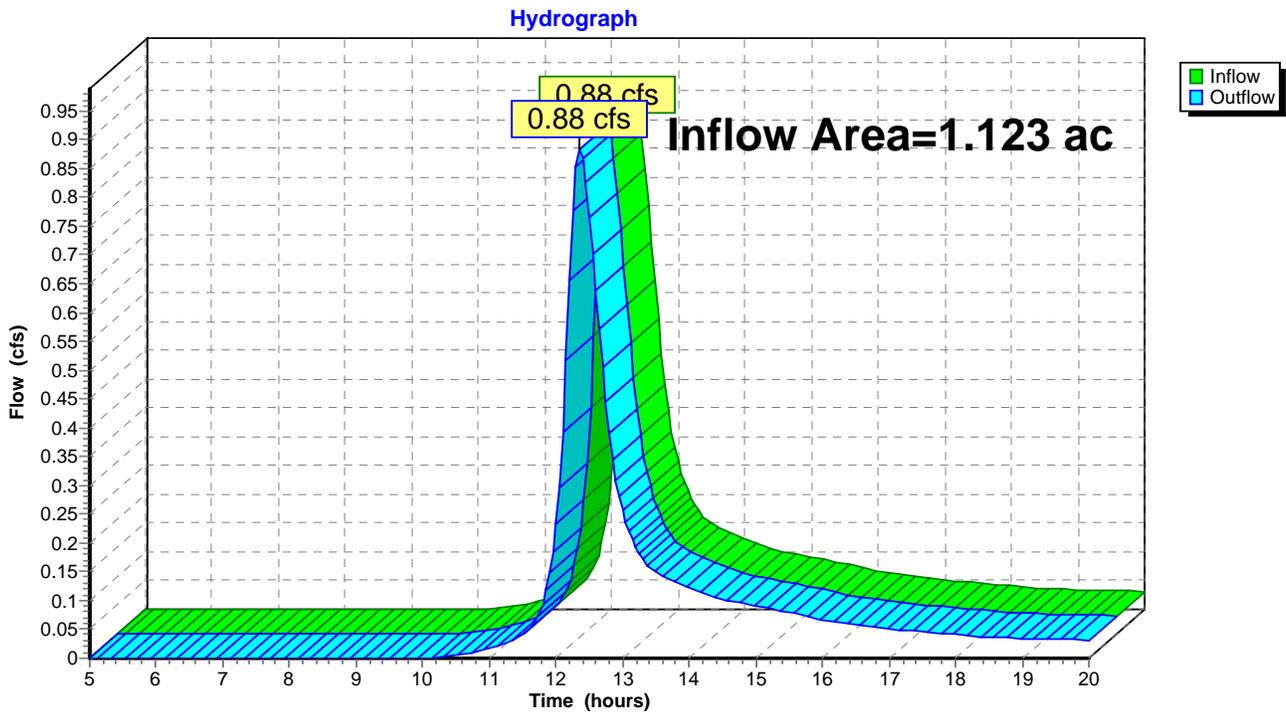
### Summary for Reach AP-3: Analysis Point 3

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.123 ac, 0.00% Impervious, Inflow Depth > 1.02" for 2-Year event  
Inflow = 0.88 cfs @ 12.36 hrs, Volume= 0.095 af  
Outflow = 0.88 cfs @ 12.36 hrs, Volume= 0.095 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

### Reach AP-3: Analysis Point 3



Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points

Runoff by SCS TR-20 method, UH=SCS

Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

**Subcatchment S-1: Flow to Vernal Pool** Runoff Area=41,056 sf 0.00% Impervious Runoff Depth>2.18"  
Flow Length=288' Tc=43.3 min CN=80 Runoff=1.24 cfs 0.172 af

**Subcatchment S-2: Flow to offsite** Runoff Area=3,465 sf 0.00% Impervious Runoff Depth>2.12"  
Flow Length=152' Slope=0.0270 '/ Tc=28.0 min CN=79 Runoff=0.12 cfs 0.014 af

**Subcatchment S-3: Flow to offsite** Runoff Area=48,900 sf 0.00% Impervious Runoff Depth>2.12"  
Flow Length=324' Tc=24.4 min CN=79 Runoff=1.86 cfs 0.198 af

**Reach AP-1: Analysis Point 1** Inflow=1.24 cfs 0.172 af  
Outflow=1.24 cfs 0.172 af

**Reach AP-2: Analysis Point 2** Inflow=0.12 cfs 0.014 af  
Outflow=0.12 cfs 0.014 af

**Reach AP-3: Analysis Point 3** Inflow=1.86 cfs 0.198 af  
Outflow=1.86 cfs 0.198 af

**Total Runoff Area = 2.145 ac Runoff Volume = 0.384 af Average Runoff Depth = 2.15"**  
**100.00% Pervious = 2.145 ac 0.00% Impervious = 0.000 ac**

**Summary for Subcatchment S-1: Flow to Vernal Pool**

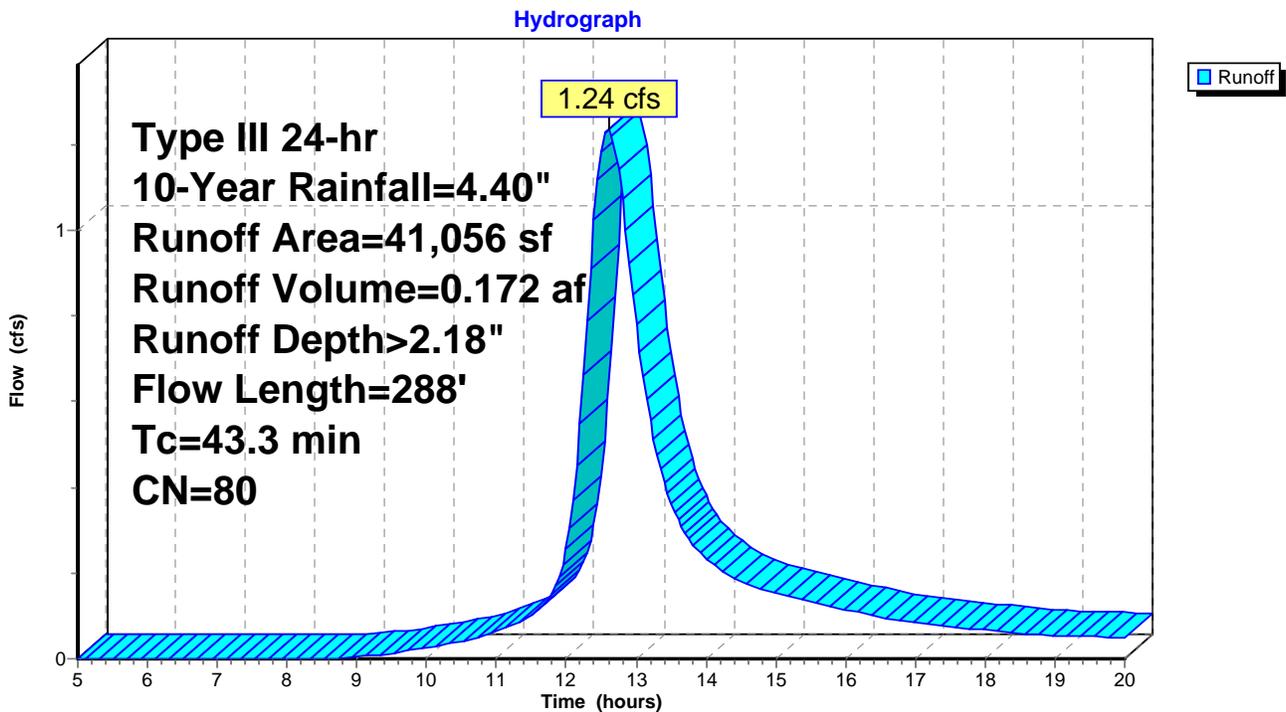
Runoff = 1.24 cfs @ 12.60 hrs, Volume= 0.172 af, Depth> 2.18"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Type III 24-hr 10-Year Rainfall=4.40"

Area (sf)	CN	Description
37,957	79	Woods, Fair, HSG D
3,099	98	Water Surface, 0% imp, HSG D
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41,056		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
41.2	150	0.0100	0.06		<b>Sheet Flow, Woods</b> Woods: Light underbrush n= 0.400 P2= 2.90"
2.1	138	0.0500	1.12		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
43.3	288	Total			

**Subcatchment S-1: Flow to Vernal Pool**



**Summary for Subcatchment S-2: Flow to offsite**

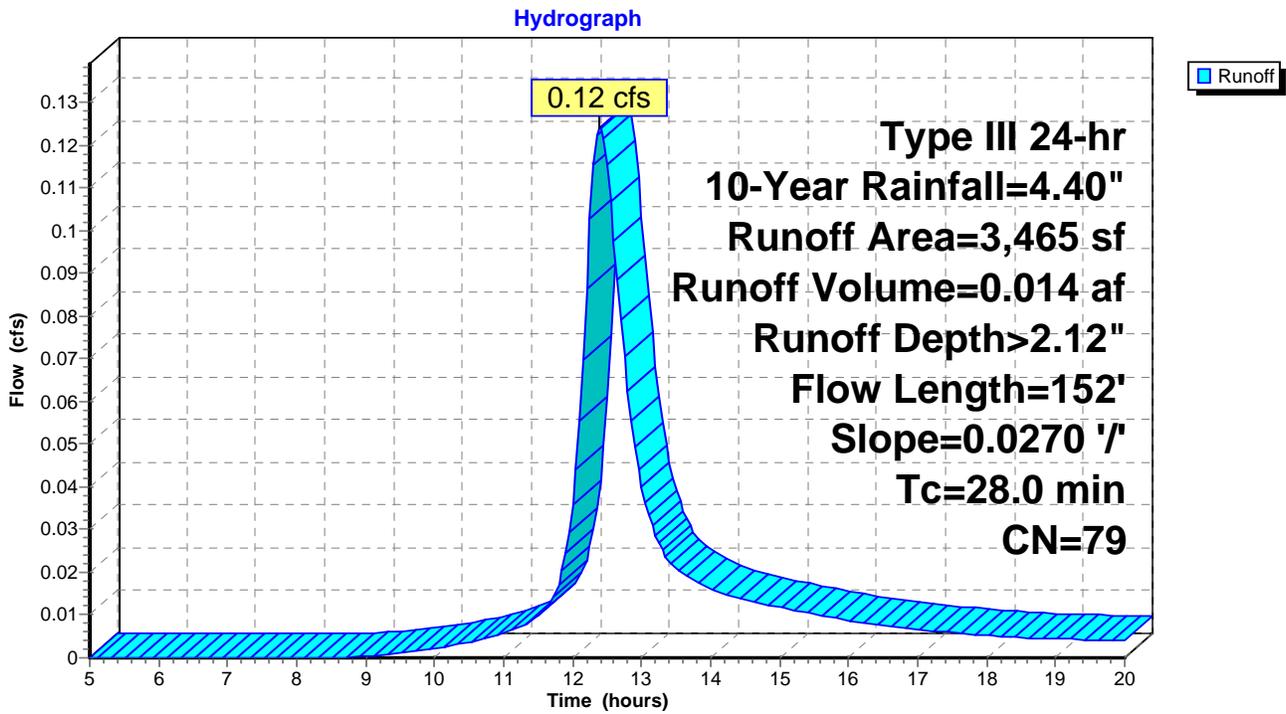
Runoff = 0.12 cfs @ 12.40 hrs, Volume= 0.014 af, Depth> 2.12"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Type III 24-hr 10-Year Rainfall=4.40"

Area (sf)	CN	Description
3,465	79	Woods, Fair, HSG D
3,465		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.0	152	0.0270	0.09		<b>Sheet Flow, Woods</b> Woods: Light underbrush n= 0.400 P2= 2.90"

**Subcatchment S-2: Flow to offsite**



**Summary for Subcatchment S-3: Flow to offsite**

Runoff = 1.86 cfs @ 12.34 hrs, Volume= 0.198 af, Depth> 2.12"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Type III 24-hr 10-Year Rainfall=4.40"

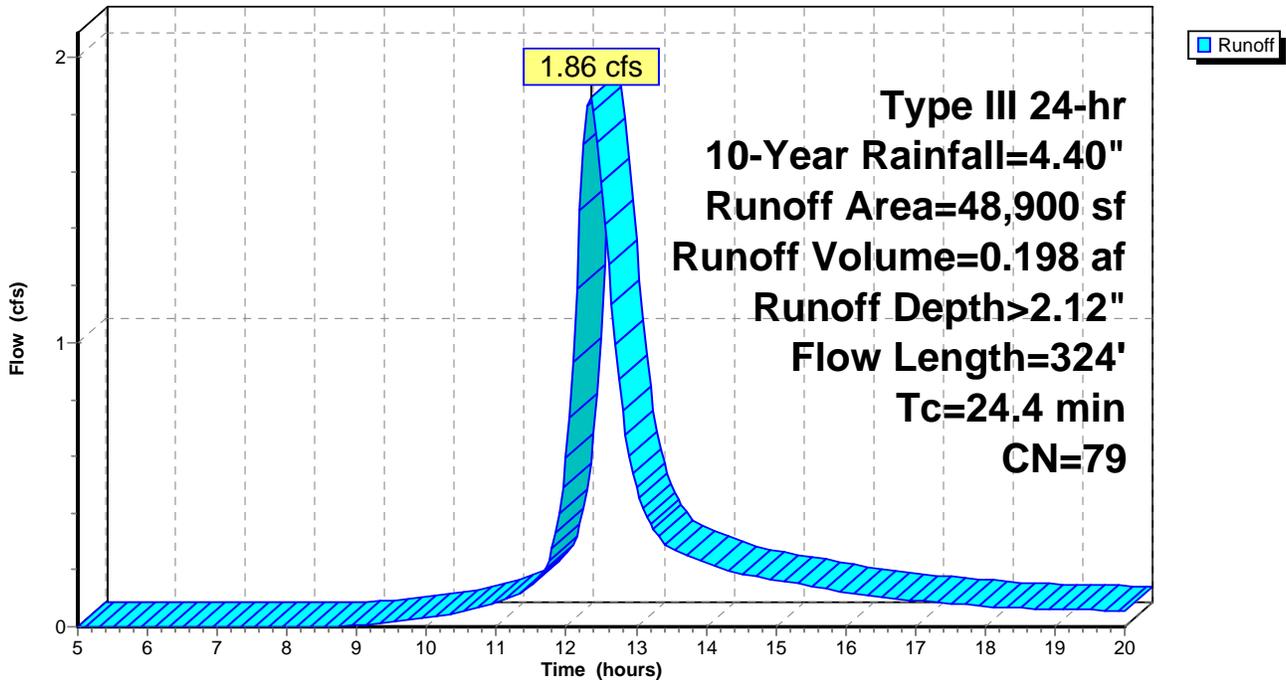
Area (sf)	CN	Description
48,900	79	Woods, Fair, HSG D
48,900		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.6	150	0.0500	0.12		<b>Sheet Flow, Woods</b> Woods: Light underbrush n= 0.400 P2= 2.90"
0.6	59	0.1250	1.77		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
2.2	115	0.0300	0.87		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
24.4	324	Total			

**Subcatchment S-3: Flow to offsite**

Hydrograph



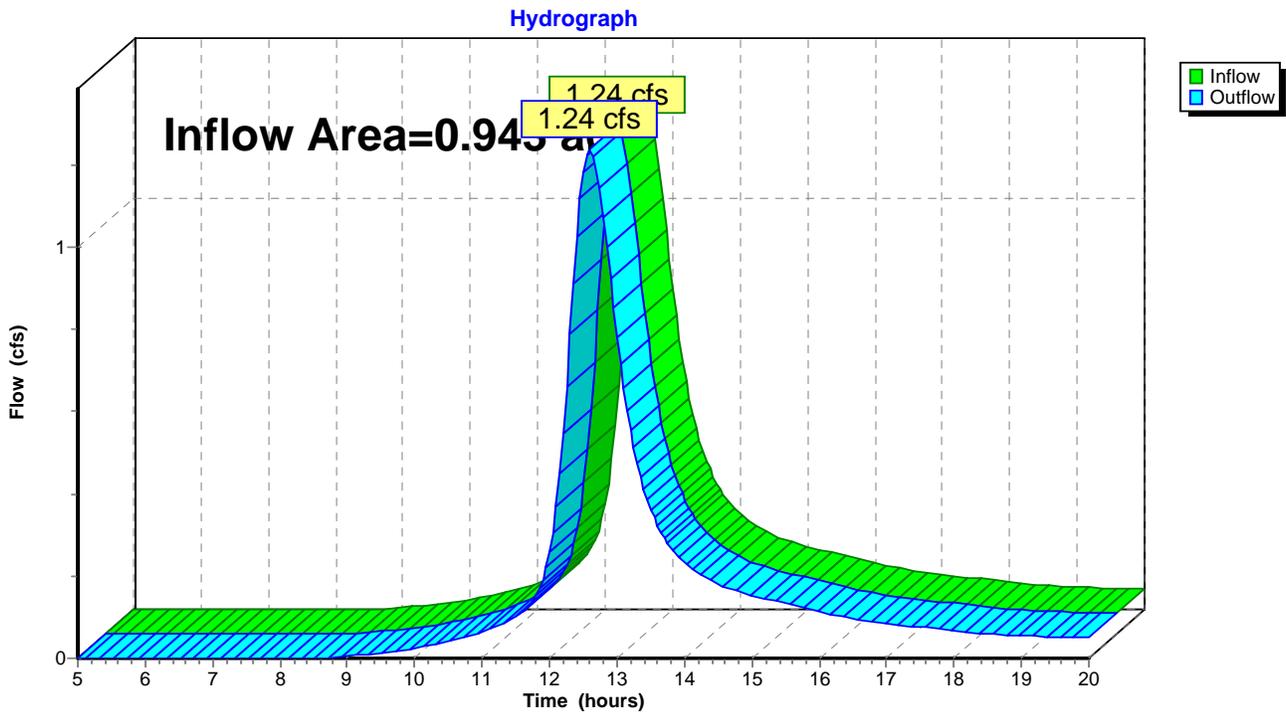
### Summary for Reach AP-1: Analysis Point 1

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.943 ac, 0.00% Impervious, Inflow Depth > 2.18" for 10-Year event  
Inflow = 1.24 cfs @ 12.60 hrs, Volume= 0.172 af  
Outflow = 1.24 cfs @ 12.60 hrs, Volume= 0.172 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

### Reach AP-1: Analysis Point 1



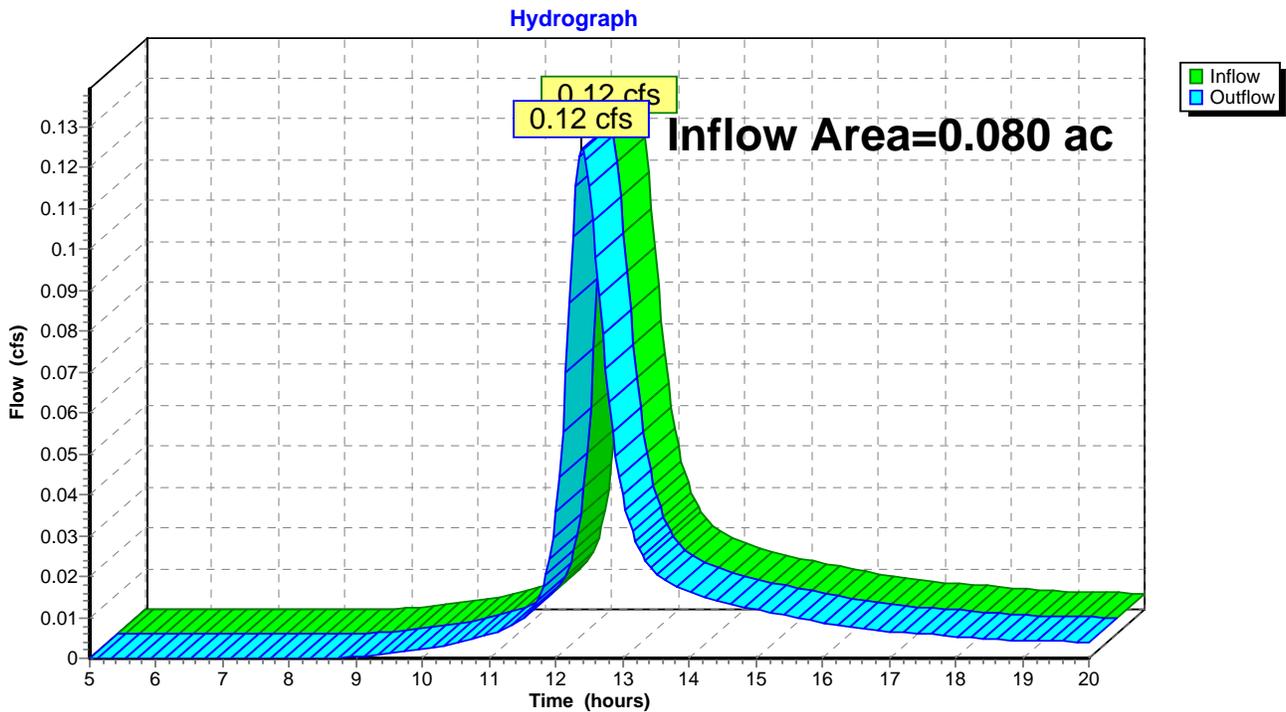
### Summary for Reach AP-2: Analysis Point 2

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.080 ac, 0.00% Impervious, Inflow Depth > 2.12" for 10-Year event  
Inflow = 0.12 cfs @ 12.40 hrs, Volume= 0.014 af  
Outflow = 0.12 cfs @ 12.40 hrs, Volume= 0.014 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

### Reach AP-2: Analysis Point 2



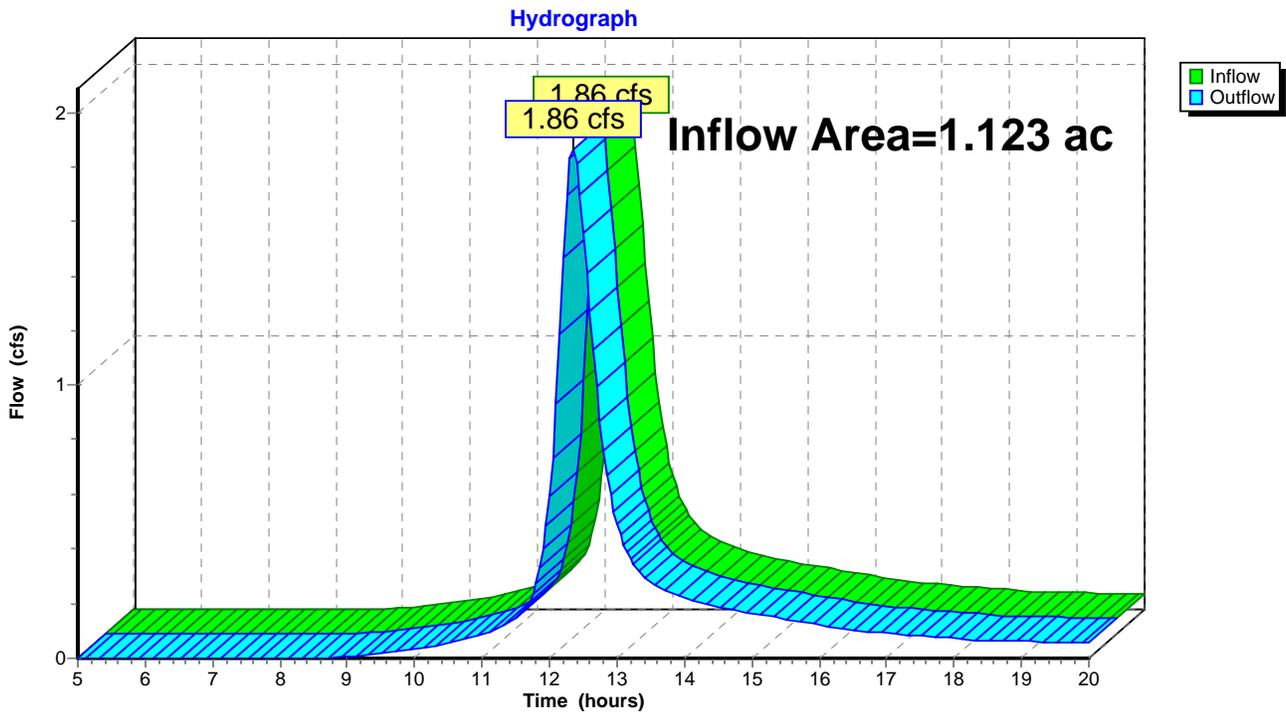
### Summary for Reach AP-3: Analysis Point 3

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.123 ac, 0.00% Impervious, Inflow Depth > 2.12" for 10-Year event  
Inflow = 1.86 cfs @ 12.34 hrs, Volume= 0.198 af  
Outflow = 1.86 cfs @ 12.34 hrs, Volume= 0.198 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

### Reach AP-3: Analysis Point 3



Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points

Runoff by SCS TR-20 method, UH=SCS

Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

**Subcatchment S-1: Flow to Vernal Pool** Runoff Area=41,056 sf 0.00% Impervious Runoff Depth>2.75"  
Flow Length=288' Tc=43.3 min CN=80 Runoff=1.55 cfs 0.216 af

**Subcatchment S-2: Flow to offsite** Runoff Area=3,465 sf 0.00% Impervious Runoff Depth>2.68"  
Flow Length=152' Slope=0.0270 '/ Tc=28.0 min CN=79 Runoff=0.16 cfs 0.018 af

**Subcatchment S-3: Flow to offsite** Runoff Area=48,900 sf 0.00% Impervious Runoff Depth>2.68"  
Flow Length=324' Tc=24.4 min CN=79 Runoff=2.35 cfs 0.251 af

**Reach AP-1: Analysis Point 1** Inflow=1.55 cfs 0.216 af  
Outflow=1.55 cfs 0.216 af

**Reach AP-2: Analysis Point 2** Inflow=0.16 cfs 0.018 af  
Outflow=0.16 cfs 0.018 af

**Reach AP-3: Analysis Point 3** Inflow=2.35 cfs 0.251 af  
Outflow=2.35 cfs 0.251 af

**Total Runoff Area = 2.145 ac Runoff Volume = 0.484 af Average Runoff Depth = 2.71"**  
**100.00% Pervious = 2.145 ac 0.00% Impervious = 0.000 ac**

**Summary for Subcatchment S-1: Flow to Vernal Pool**

Runoff = 1.55 cfs @ 12.59 hrs, Volume= 0.216 af, Depth> 2.75"

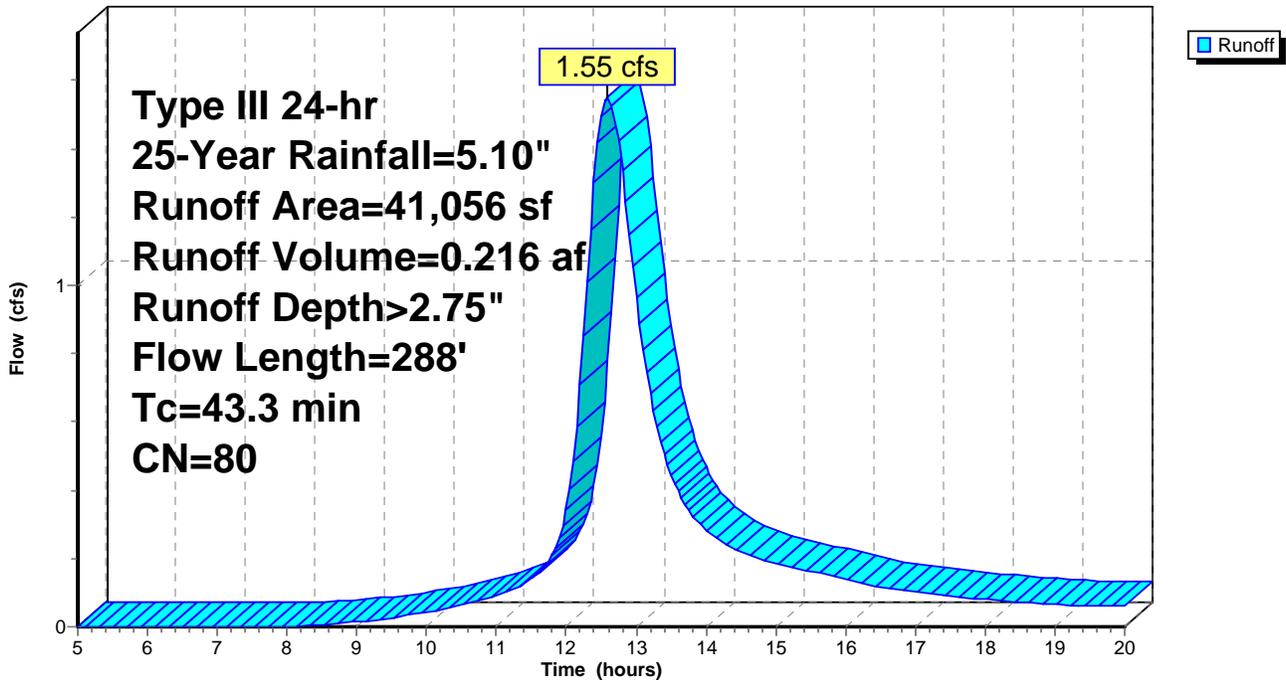
Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Type III 24-hr 25-Year Rainfall=5.10"

Area (sf)	CN	Description
37,957	79	Woods, Fair, HSG D
3,099	98	Water Surface, 0% imp, HSG D
41,056	80	Weighted Average
41,056		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
41.2	150	0.0100	0.06		<b>Sheet Flow, Woods</b> Woods: Light underbrush n= 0.400 P2= 2.90"
2.1	138	0.0500	1.12		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
43.3	288	Total			

**Subcatchment S-1: Flow to Vernal Pool**

Hydrograph



**Summary for Subcatchment S-2: Flow to offsite**

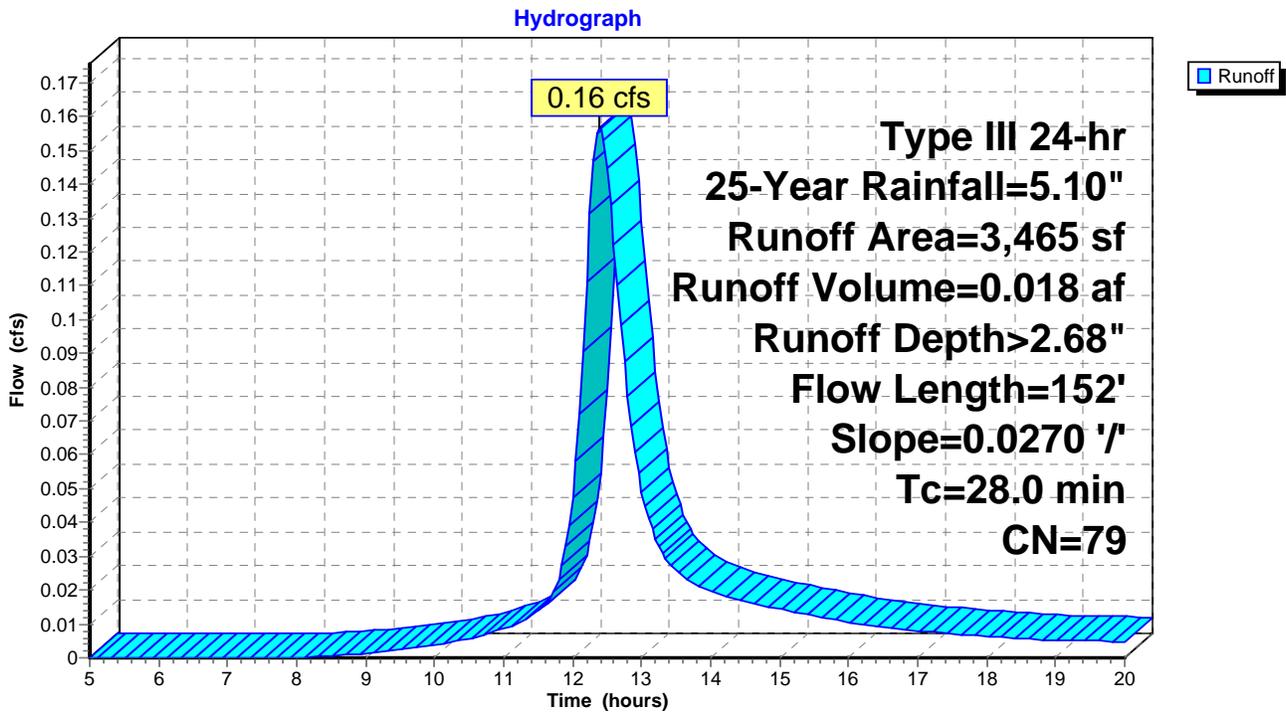
Runoff = 0.16 cfs @ 12.39 hrs, Volume= 0.018 af, Depth> 2.68"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Type III 24-hr 25-Year Rainfall=5.10"

Area (sf)	CN	Description
3,465	79	Woods, Fair, HSG D
3,465		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.0	152	0.0270	0.09		<b>Sheet Flow, Woods</b> Woods: Light underbrush n= 0.400 P2= 2.90"

**Subcatchment S-2: Flow to offsite**



**Summary for Subcatchment S-3: Flow to offsite**

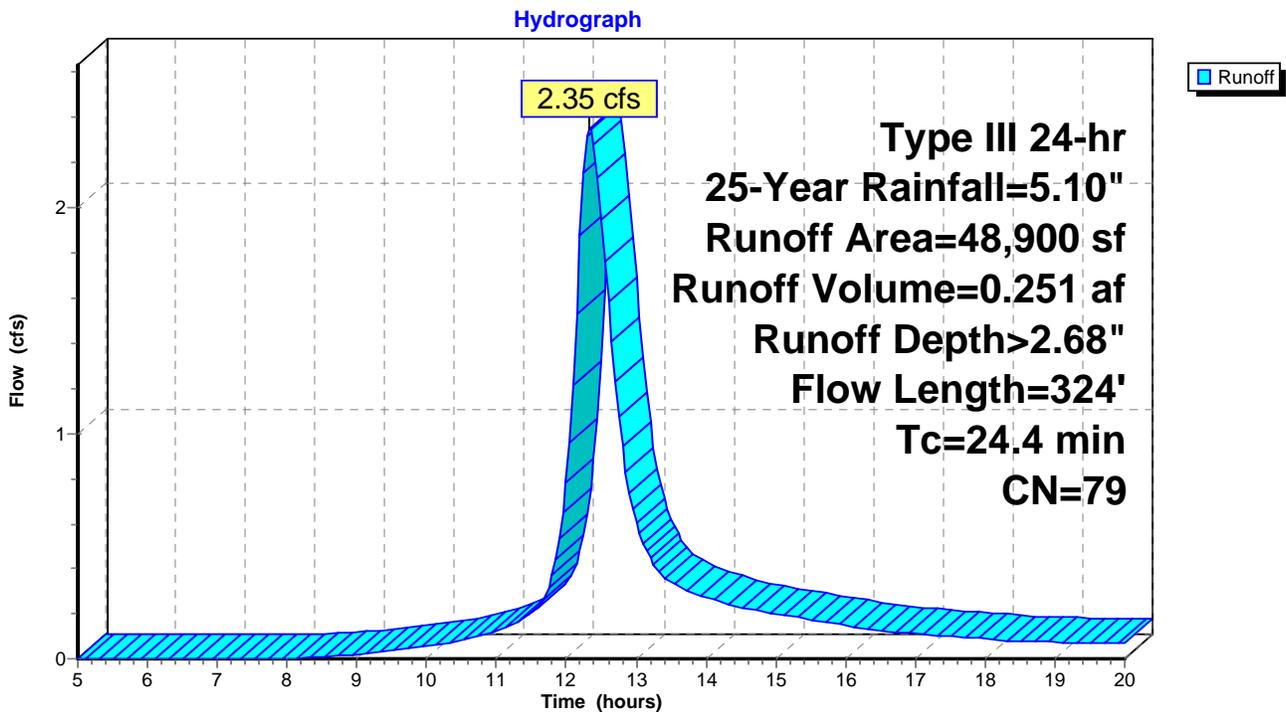
Runoff = 2.35 cfs @ 12.34 hrs, Volume= 0.251 af, Depth> 2.68"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Type III 24-hr 25-Year Rainfall=5.10"

Area (sf)	CN	Description
48,900	79	Woods, Fair, HSG D
48,900		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.6	150	0.0500	0.12		<b>Sheet Flow, Woods</b> Woods: Light underbrush n= 0.400 P2= 2.90"
0.6	59	0.1250	1.77		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
2.2	115	0.0300	0.87		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
24.4	324	Total			

**Subcatchment S-3: Flow to offsite**



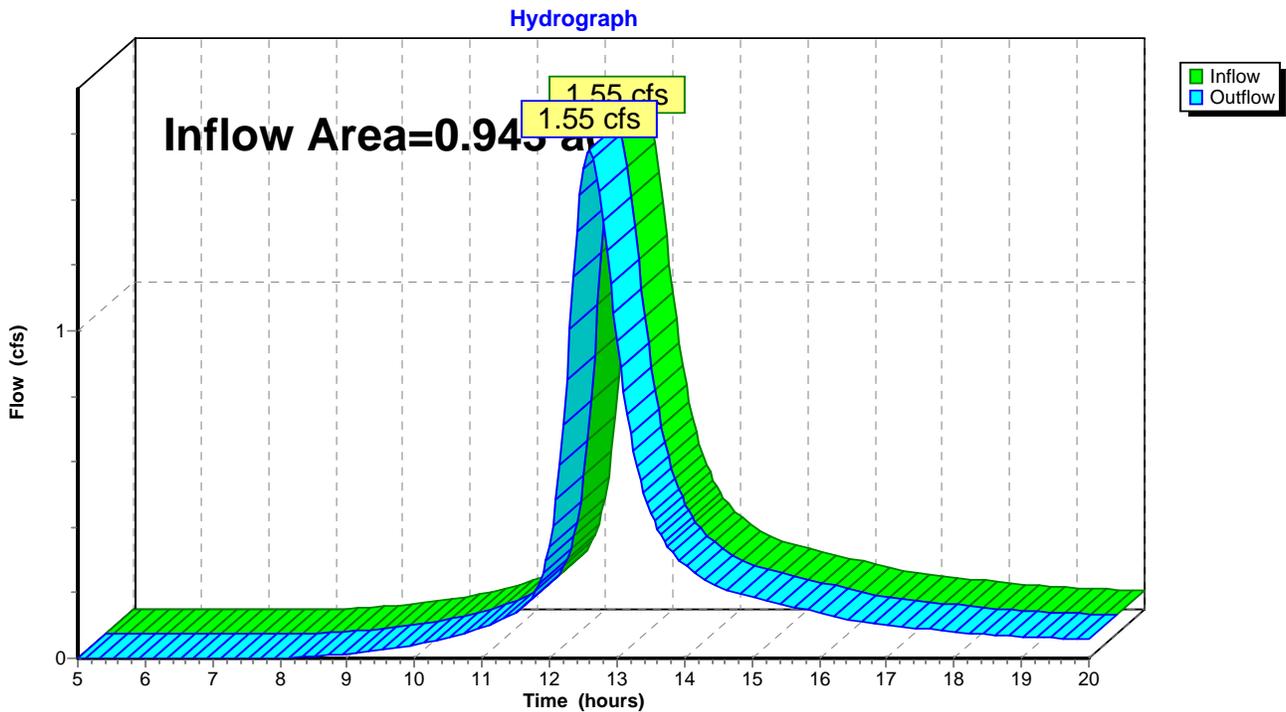
### Summary for Reach AP-1: Analysis Point 1

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.943 ac, 0.00% Impervious, Inflow Depth > 2.75" for 25-Year event  
Inflow = 1.55 cfs @ 12.59 hrs, Volume= 0.216 af  
Outflow = 1.55 cfs @ 12.59 hrs, Volume= 0.216 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

### Reach AP-1: Analysis Point 1



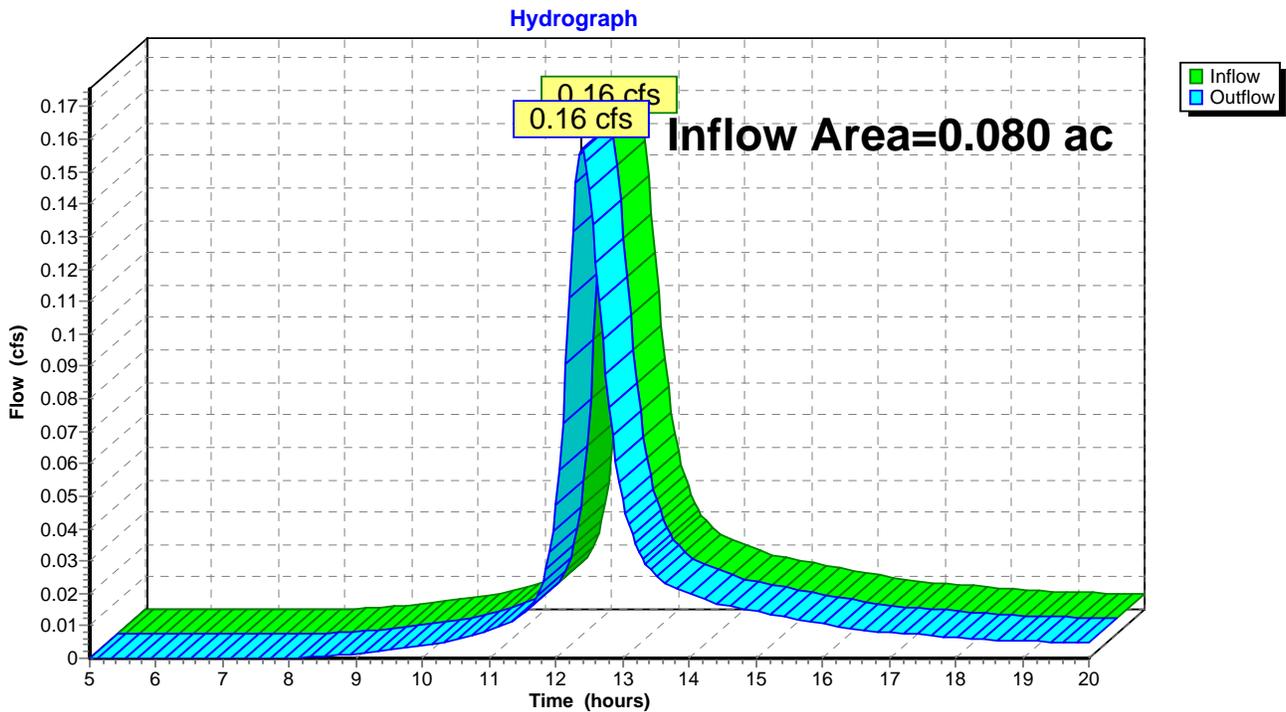
### Summary for Reach AP-2: Analysis Point 2

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.080 ac, 0.00% Impervious, Inflow Depth > 2.68" for 25-Year event  
Inflow = 0.16 cfs @ 12.39 hrs, Volume= 0.018 af  
Outflow = 0.16 cfs @ 12.39 hrs, Volume= 0.018 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

### Reach AP-2: Analysis Point 2



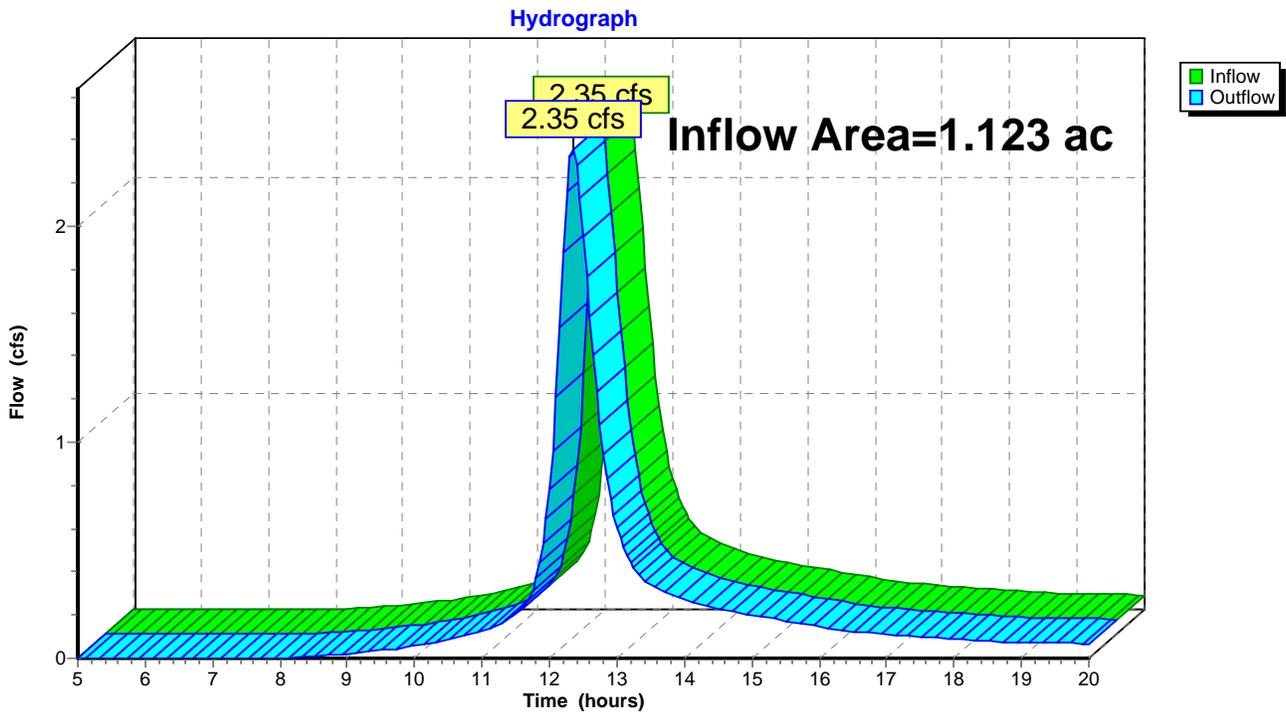
### Summary for Reach AP-3: Analysis Point 3

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.123 ac, 0.00% Impervious, Inflow Depth > 2.68" for 25-Year event  
Inflow = 2.35 cfs @ 12.34 hrs, Volume= 0.251 af  
Outflow = 2.35 cfs @ 12.34 hrs, Volume= 0.251 af, Atten= 0%, Lag= 0.0 min

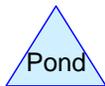
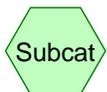
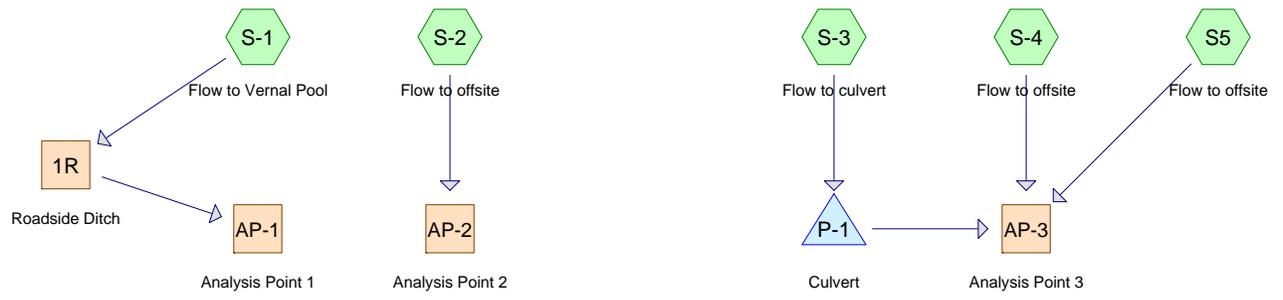
Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

### Reach AP-3: Analysis Point 3





## Post Development



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## Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
1.388	79	Woods, Fair, HSG D (S-1, S-2, S-3, S-4)
0.354	80	>75% Grass cover, Good, HSG D (S-1, S-2, S-3, S-4)
0.144	91	Gravel roads, HSG D (S-1, S-2, S-4)
0.187	96	Gravel surface, HSG D (S5)
0.071	98	Water Surface, 0% imp, HSG D (S-1)
<b>2.145</b>	<b>82</b>	<b>TOTAL AREA</b>

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## Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
0.000	HSG C	
2.145	HSG D	S-1, S-2, S-3, S-4, S5
0.000	Other	
<b>2.145</b>		<b>TOTAL AREA</b>

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**Ground Covers (all nodes)**

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.000	0.354	0.000	0.354	>75% Grass cover, Good	S-1, S-2, S-3, S-4
0.000	0.000	0.000	0.144	0.000	0.144	Gravel roads	S-1, S-2, S-4
0.000	0.000	0.000	0.187	0.000	0.187	Gravel surface	S5
0.000	0.000	0.000	1.388	0.000	1.388	Woods, Fair	S-1, S-2, S-3, S-4
0.000	0.000	0.000	0.071	0.000	0.071	Water Surface, 0% imp	S-1
<b>0.000</b>	<b>0.000</b>	<b>0.000</b>	<b>2.145</b>	<b>0.000</b>	<b>2.145</b>	<b>TOTAL AREA</b>	

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## Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Inside-Fill (inches)
1	P-1	91.00	90.70	28.0	0.0107	0.013	15.0	0.0	0.0

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points  
Runoff by SCS TR-20 method, UH=SCS  
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

**Subcatchment S-1: Flow to Vernal Pool** Runoff Area=33,347 sf 0.00% Impervious Runoff Depth>1.14"  
Flow Length=288' Tc=11.4 min CN=81 Runoff=0.91 cfs 0.073 af

**Subcatchment S-2: Flow to offsite** Runoff Area=7,368 sf 0.00% Impervious Runoff Depth>1.26"  
Flow Length=191' Tc=15.0 min CN=83 Runoff=0.20 cfs 0.018 af

**Subcatchment S-3: Flow to culvert** Runoff Area=25,964 sf 0.00% Impervious Runoff Depth>1.02"  
Flow Length=219' Slope=0.0900 '/' Tc=17.2 min CN=79 Runoff=0.54 cfs 0.051 af

**Subcatchment S-4: Flow to offsite** Runoff Area=18,586 sf 0.00% Impervious Runoff Depth>1.14"  
Flow Length=321' Tc=18.5 min CN=81 Runoff=0.42 cfs 0.040 af

**Subcatchment S5: Flow to offsite** Runoff Area=8,160 sf 0.00% Impervious Runoff Depth>2.32"  
Flow Length=102' Slope=0.0250 '/' Tc=1.2 min CN=96 Runoff=0.56 cfs 0.036 af

**Reach 1R: Roadside Ditch** Avg. Flow Depth=0.16' Max Vel=2.31 fps Inflow=0.91 cfs 0.073 af  
n=0.030 L=10.0' S=0.0330 '/' Capacity=32.03 cfs Outflow=0.91 cfs 0.073 af

**Reach AP-1: Analysis Point 1** Inflow=0.91 cfs 0.073 af  
Outflow=0.91 cfs 0.073 af

**Reach AP-2: Analysis Point 2** Inflow=0.20 cfs 0.018 af  
Outflow=0.20 cfs 0.018 af

**Reach AP-3: Analysis Point 3** Inflow=1.15 cfs 0.127 af  
Outflow=1.15 cfs 0.127 af

**Pond P-1: Culvert** Peak Elev=91.39' Storage=33 cf Inflow=0.54 cfs 0.051 af  
15.0" Round Culvert n=0.013 L=28.0' S=0.0107 '/' Outflow=0.54 cfs 0.051 af

**Total Runoff Area = 2.145 ac Runoff Volume = 0.218 af Average Runoff Depth = 1.22"**  
**100.00% Pervious = 2.145 ac 0.00% Impervious = 0.000 ac**

**Summary for Subcatchment S-1: Flow to Vernal Pool**

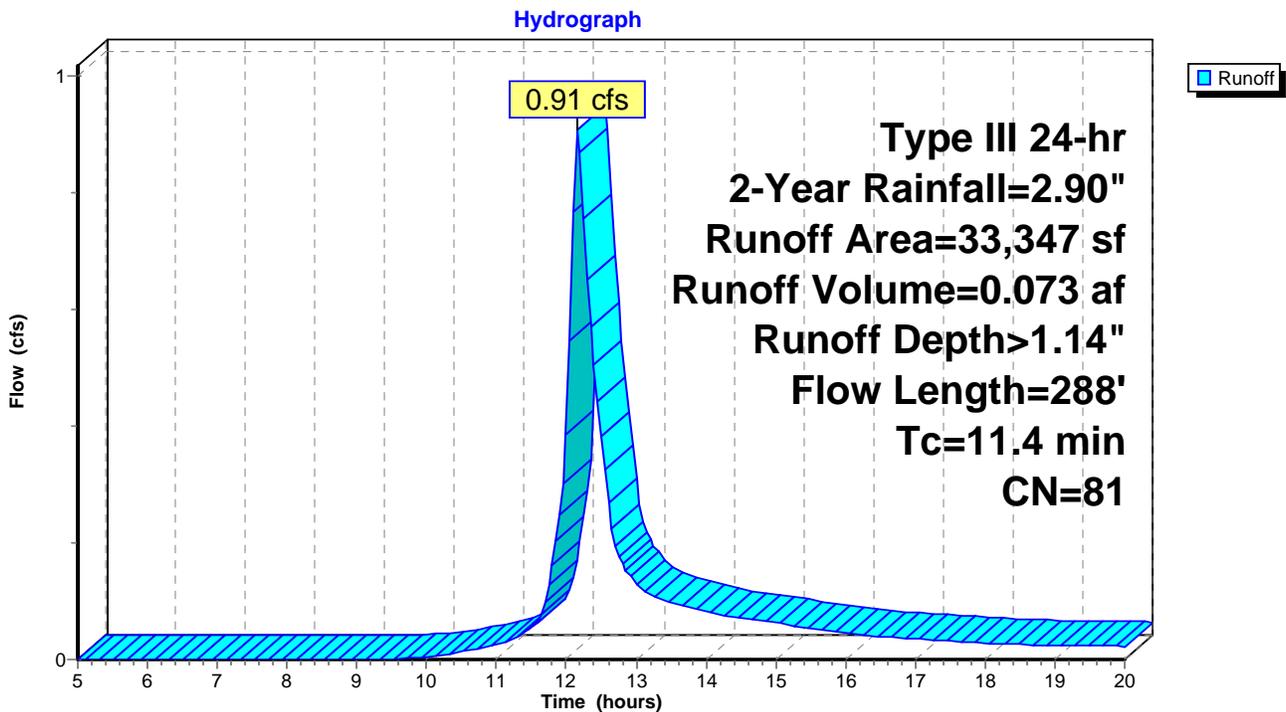
Runoff = 0.91 cfs @ 12.17 hrs, Volume= 0.073 af, Depth> 1.14"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr 2-Year Rainfall=2.90"

Area (sf)	CN	Description
26,635	79	Woods, Fair, HSG D
1,171	91	Gravel roads, HSG D
2,442	80	>75% Grass cover, Good, HSG D
3,099	98	Water Surface, 0% imp, HSG D
33,347	81	Weighted Average
33,347		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.9	150	0.0500	0.25		<b>Sheet Flow, Woods</b> Grass: Short n= 0.150 P2= 2.90"
0.1	70	0.0500	7.88	39.42	<b>Trap/Vee/Rect Channel Flow,</b> Bot.W=2.00' D=1.00' Z= 3.0 '/' Top.W=8.00' n= 0.030 Earth, grassed & winding
1.4	68	0.0260	0.81		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
11.4	288	Total			

**Subcatchment S-1: Flow to Vernal Pool**



**Summary for Subcatchment S-2: Flow to offsite**

Runoff = 0.20 cfs @ 12.21 hrs, Volume= 0.018 af, Depth> 1.26"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr 2-Year Rainfall=2.90"

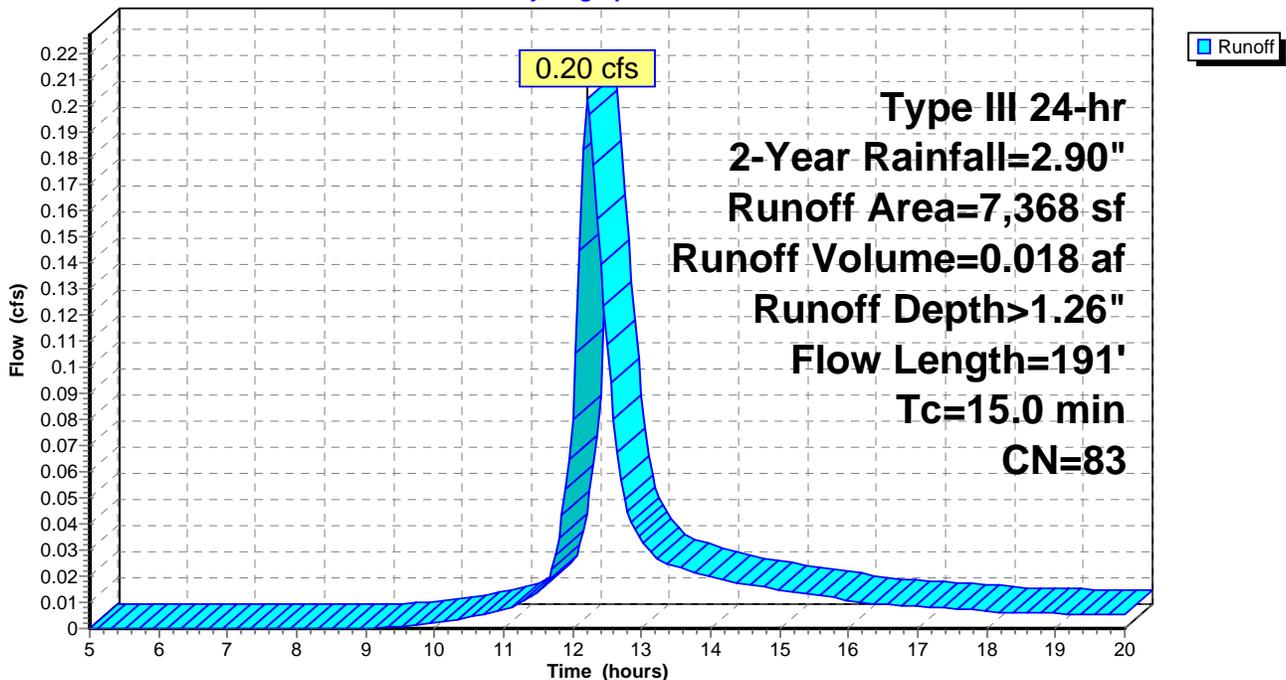
Area (sf)	CN	Description
2,261	91	Gravel roads, HSG D
2,623	80	>75% Grass cover, Good, HSG D
2,484	79	Woods, Fair, HSG D
7,368	83	Weighted Average
7,368		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.6	58	0.0200	0.07		<b>Sheet Flow, Woods</b> Woods: Light underbrush n= 0.400 P2= 2.90"
0.4	133	0.0230	5.35	26.74	<b>Trap/Vee/Rect Channel Flow,</b> Bot.W=2.00' D=1.00' Z= 3.0 '/' Top.W=8.00' n= 0.030 Earth, grassed & winding
15.0	191	Total			

**Subcatchment S-2: Flow to offsite**

Hydrograph



**Summary for Subcatchment S-3: Flow to culvert**

Runoff = 0.54 cfs @ 12.25 hrs, Volume= 0.051 af, Depth> 1.02"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Type III 24-hr 2-Year Rainfall=2.90"

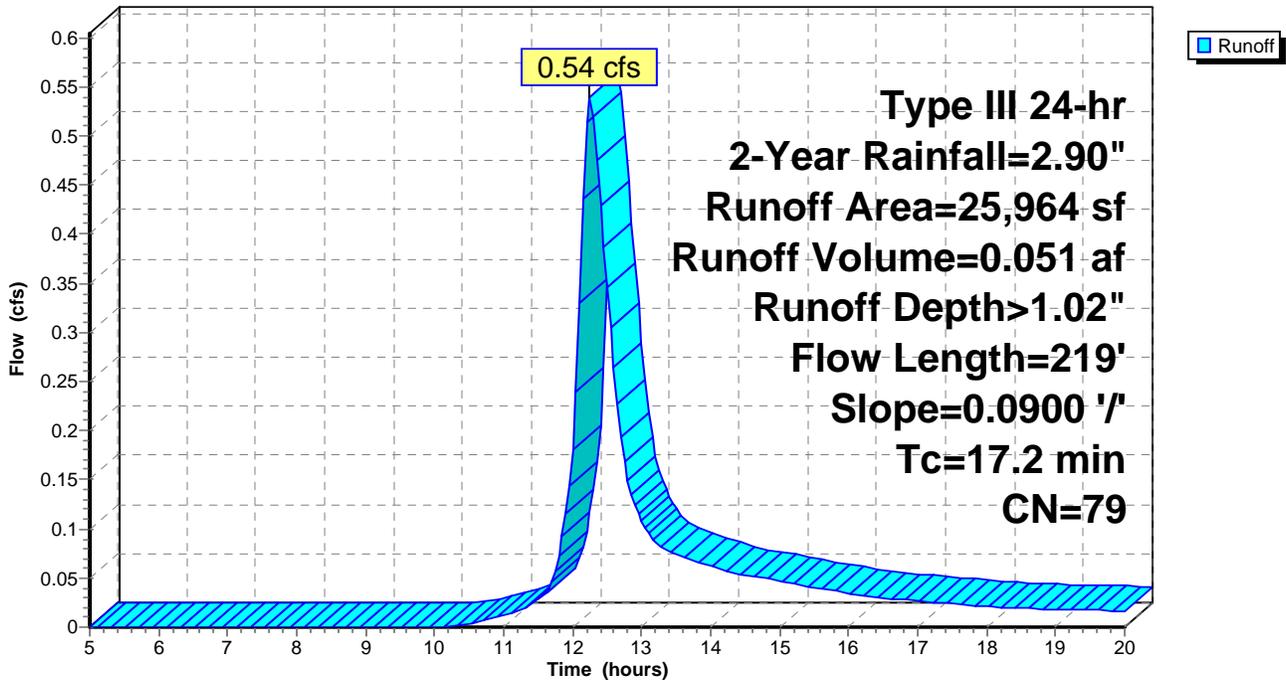
Area (sf)	CN	Description
3,670	80	>75% Grass cover, Good, HSG D
22,294	79	Woods, Fair, HSG D
25,964	79	Weighted Average
25,964		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.1	150	0.0900	0.15		<b>Sheet Flow, Woods</b> Woods: Light underbrush n= 0.400 P2= 2.90"
0.1	69	0.0900	10.58	52.89	<b>Trap/Vee/Rect Channel Flow,</b> Bot.W=2.00' D=1.00' Z= 3.0 '/' Top.W=8.00' n= 0.030 Earth, grassed & winding
17.2	219	Total			

**Subcatchment S-3: Flow to culvert**

Hydrograph



**Summary for Subcatchment S-4: Flow to offsite**

Runoff = 0.42 cfs @ 12.27 hrs, Volume= 0.040 af, Depth> 1.14"

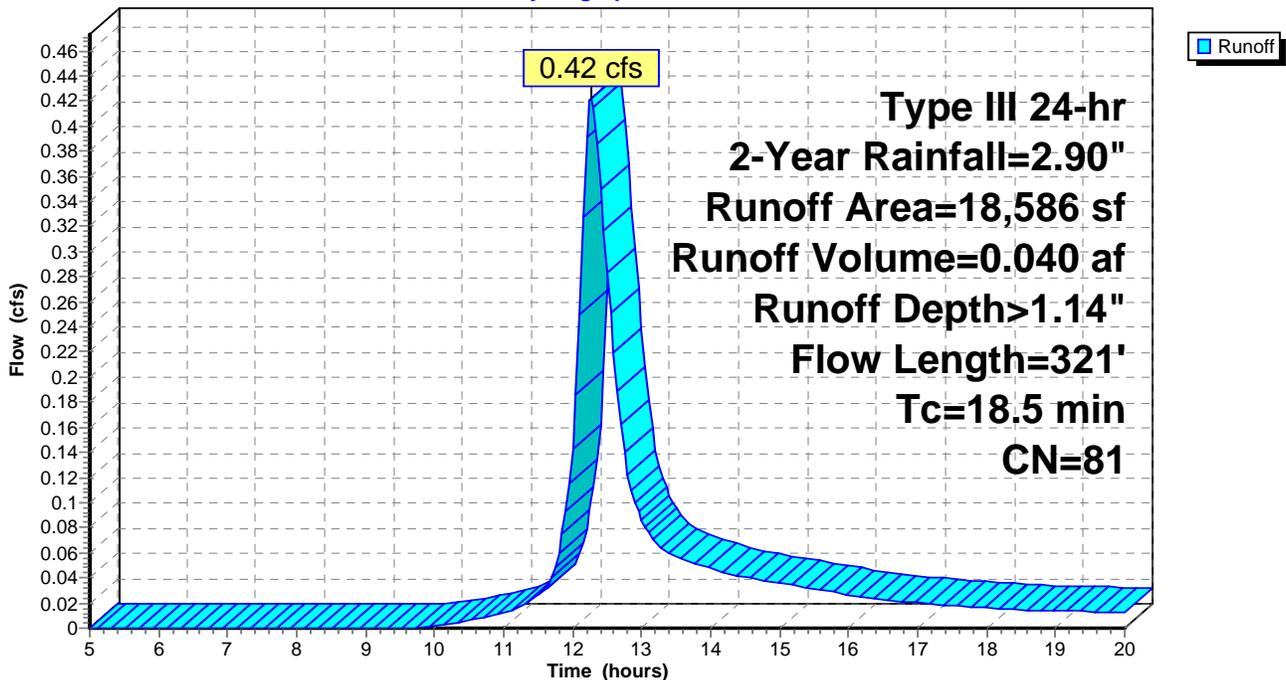
Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr 2-Year Rainfall=2.90"

Area (sf)	CN	Description
6,702	80	>75% Grass cover, Good, HSG D
9,044	79	Woods, Fair, HSG D
2,840	91	Gravel roads, HSG D
18,586	81	Weighted Average
18,586		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.9	150	0.0800	0.14		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 2.90"
0.1	13	0.1000	1.58		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
0.5	158	0.0200	4.99	24.93	<b>Trap/Vee/Rect Channel Flow,</b> Bot.W=2.00' D=1.00' Z= 3.0 '/' Top.W=8.00' n= 0.030 Earth, grassed & winding
18.5	321	Total			

**Subcatchment S-4: Flow to offsite**

Hydrograph



**Summary for Subcatchment S5: Flow to offsite**

[49] Hint:  $T_c < 2dt$  may require smaller dt

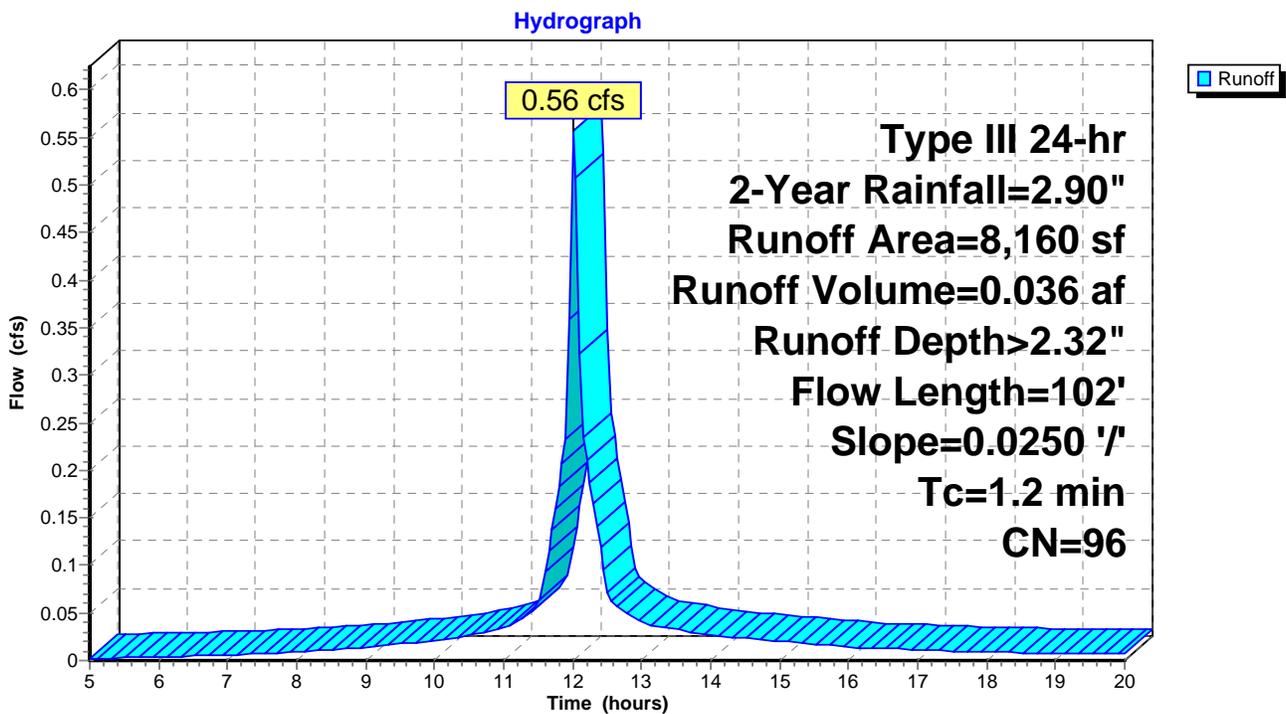
Runoff = 0.56 cfs @ 12.02 hrs, Volume= 0.036 af, Depth> 2.32"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Type III 24-hr 2-Year Rainfall=2.90"

Area (sf)	CN	Description
8,160	96	Gravel surface, HSG D
8,160		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.2	102	0.0250	1.44		Sheet Flow, Smooth surfaces n= 0.011 P2= 2.90"

**Subcatchment S5: Flow to offsite**



### Summary for Reach 1R: Roadside Ditch

Inflow Area = 0.766 ac, 0.00% Impervious, Inflow Depth > 1.14" for 2-Year event  
 Inflow = 0.91 cfs @ 12.17 hrs, Volume= 0.073 af  
 Outflow = 0.91 cfs @ 12.17 hrs, Volume= 0.073 af, Atten= 0%, Lag= 0.0 min

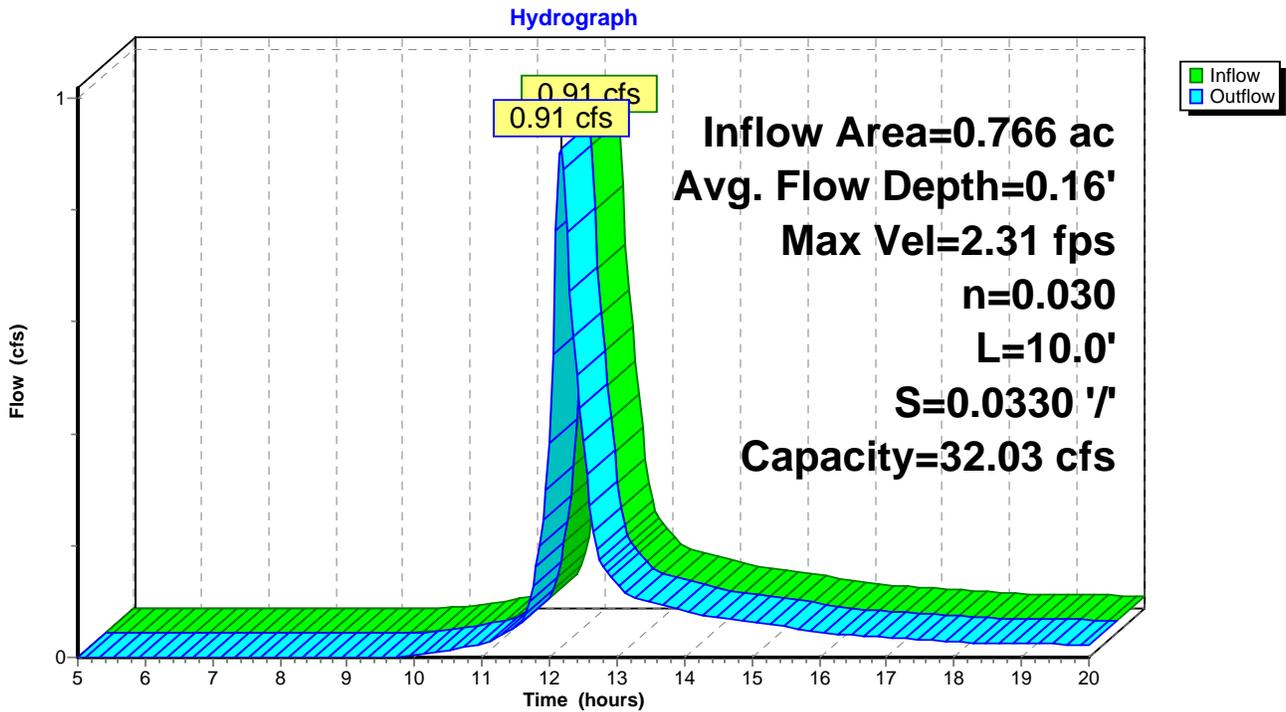
Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Max. Velocity= 2.31 fps, Min. Travel Time= 0.1 min  
 Avg. Velocity = 0.86 fps, Avg. Travel Time= 0.2 min

Peak Storage= 4 cf @ 12.17 hrs  
 Average Depth at Peak Storage= 0.16'  
 Bank-Full Depth= 1.00' Flow Area= 5.0 sf, Capacity= 32.03 cfs

2.00' x 1.00' deep channel, n= 0.030 Earth, grassed & winding  
 Side Slope Z-value= 3.0 '/ Top Width= 8.00'  
 Length= 10.0' Slope= 0.0330 '/  
 Inlet Invert= 101.00', Outlet Invert= 100.67'



Reach 1R: Roadside Ditch



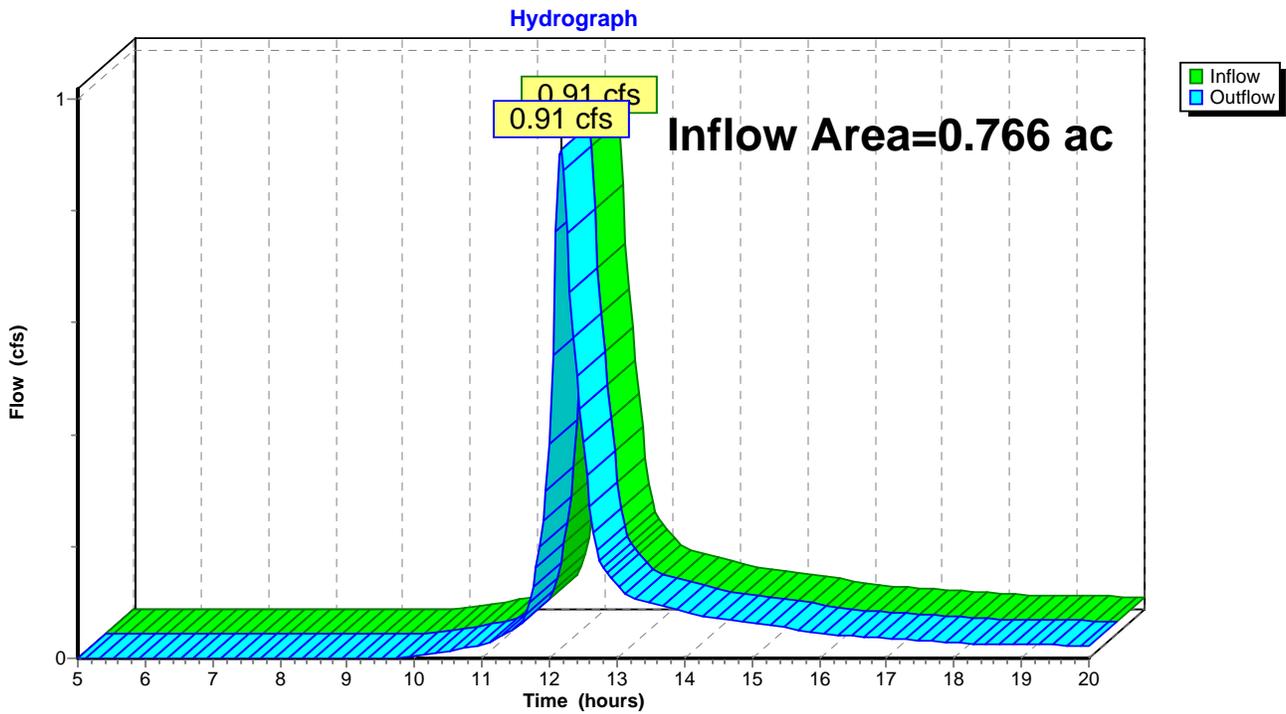
### Summary for Reach AP-1: Analysis Point 1

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.766 ac, 0.00% Impervious, Inflow Depth > 1.14" for 2-Year event  
Inflow = 0.91 cfs @ 12.17 hrs, Volume= 0.073 af  
Outflow = 0.91 cfs @ 12.17 hrs, Volume= 0.073 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

### Reach AP-1: Analysis Point 1



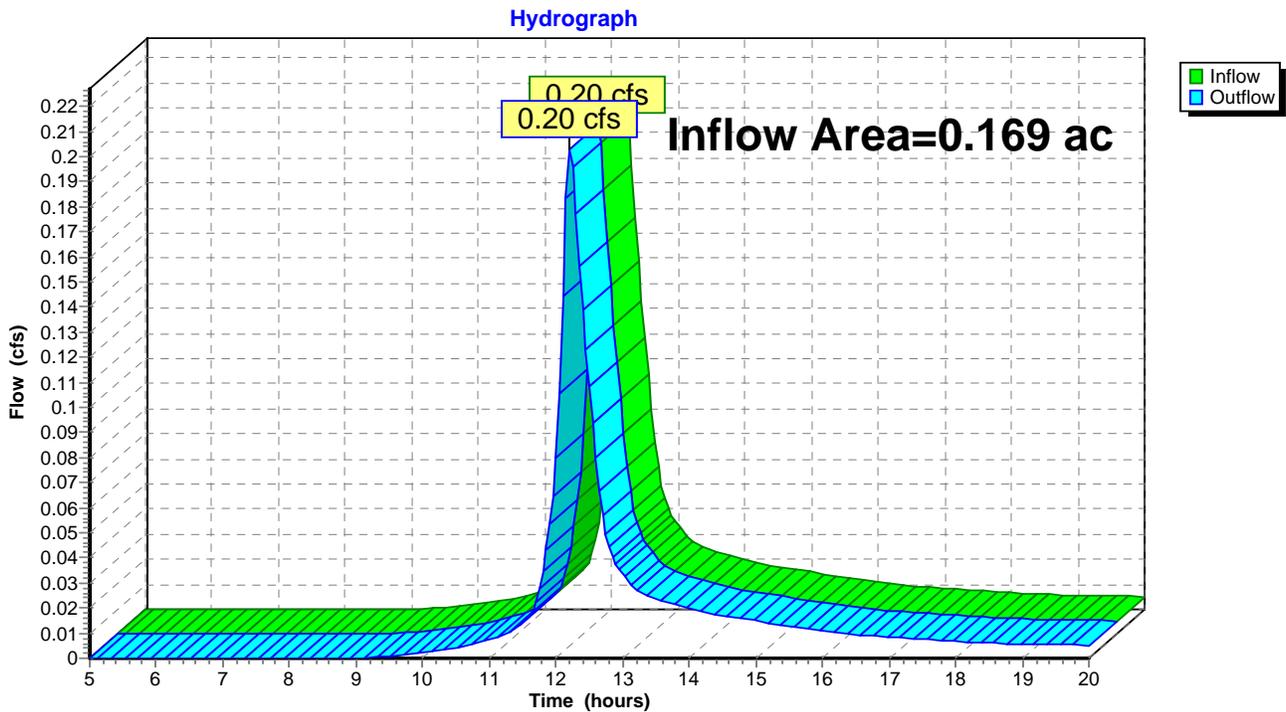
### Summary for Reach AP-2: Analysis Point 2

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.169 ac, 0.00% Impervious, Inflow Depth > 1.26" for 2-Year event  
Inflow = 0.20 cfs @ 12.21 hrs, Volume= 0.018 af  
Outflow = 0.20 cfs @ 12.21 hrs, Volume= 0.018 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

### Reach AP-2: Analysis Point 2



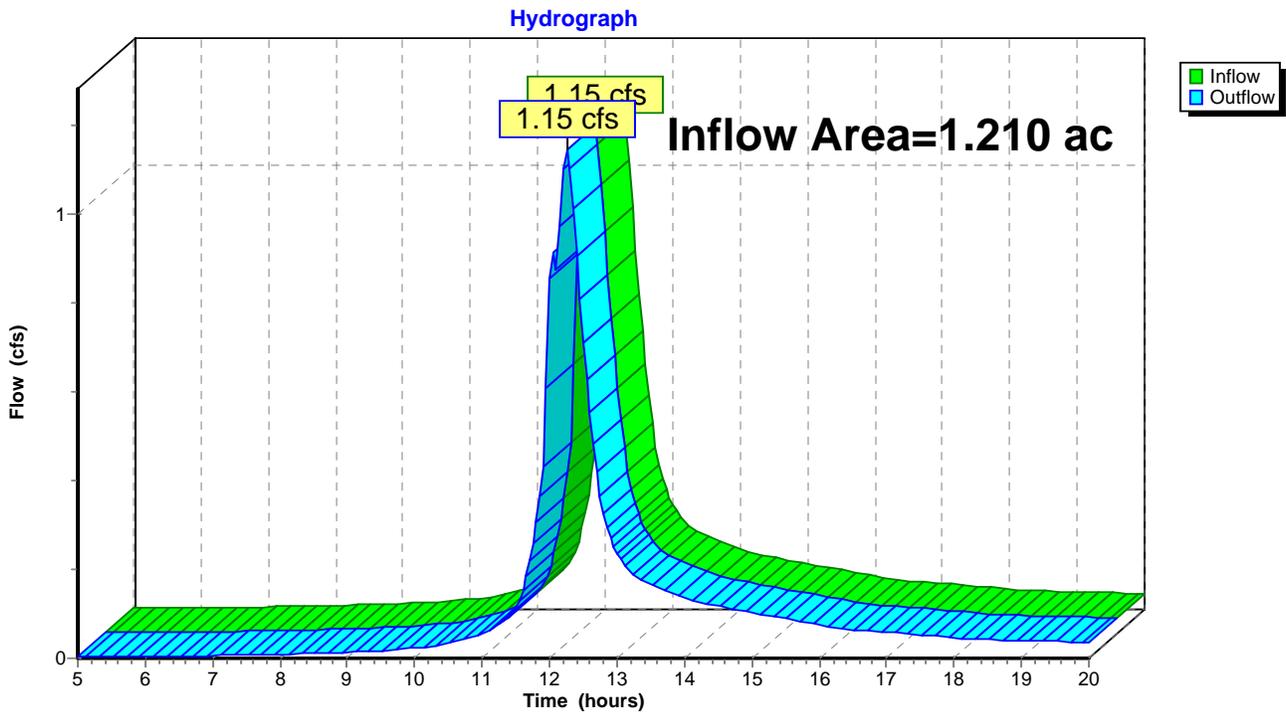
### Summary for Reach AP-3: Analysis Point 3

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.210 ac, 0.00% Impervious, Inflow Depth > 1.26" for 2-Year event  
Inflow = 1.15 cfs @ 12.25 hrs, Volume= 0.127 af  
Outflow = 1.15 cfs @ 12.25 hrs, Volume= 0.127 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

### Reach AP-3: Analysis Point 3



**Summary for Pond P-1: Culvert**

Inflow Area = 0.596 ac, 0.00% Impervious, Inflow Depth > 1.02" for 2-Year event  
 Inflow = 0.54 cfs @ 12.25 hrs, Volume= 0.051 af  
 Outflow = 0.54 cfs @ 12.26 hrs, Volume= 0.051 af, Atten= 0%, Lag= 0.6 min  
 Primary = 0.54 cfs @ 12.26 hrs, Volume= 0.051 af

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Peak Elev= 91.39' @ 12.26 hrs Surf.Area= 99 sf Storage= 33 cf  
 Flood Elev= 93.10' Surf.Area= 450 sf Storage= 406 cf

Plug-Flow detention time= 2.2 min calculated for 0.051 af (100% of inflow)  
 Center-of-Mass det. time= 1.4 min ( 820.2 - 818.9 )

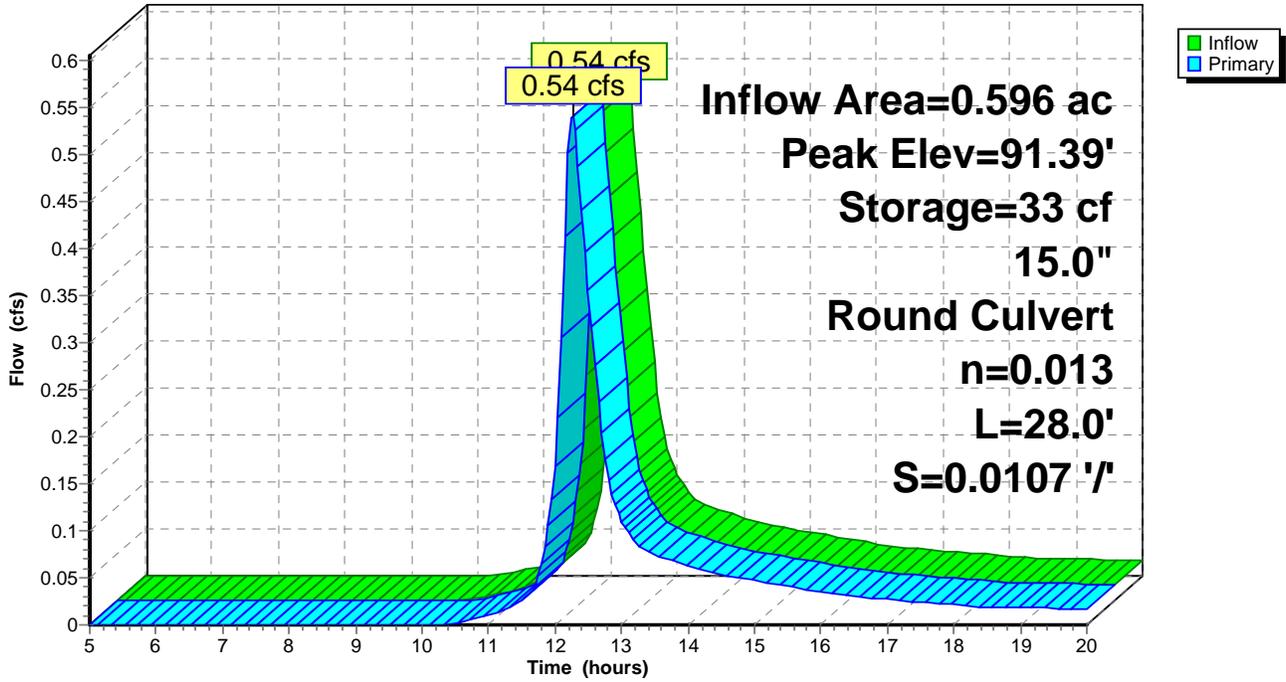
Volume	Invert	Avail.Storage	Storage Description
#1	91.00'	406 cf	<b>Culvert Inlet (Prismatic)</b> Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
91.00	70	0	0
92.00	146	108	108
93.00	450	298	406

Device	Routing	Invert	Outlet Devices
#1	Primary	91.00'	<b>15.0" Round Culvert</b> L= 28.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 91.00' / 90.70' S= 0.0107 '/' Cc= 0.900 n= 0.013, Flow Area= 1.23 sf

**Primary OutFlow** Max=0.54 cfs @ 12.26 hrs HW=91.38' TW=0.00' (Dynamic Tailwater)  
 ↑1=Culvert (Inlet Controls 0.54 cfs @ 1.67 fps)

### Pond P-1: Culvert

#### Hydrograph



Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points  
Runoff by SCS TR-20 method, UH=SCS  
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

**Subcatchment S-1: Flow to Vernal Pool** Runoff Area=33,347 sf 0.00% Impervious Runoff Depth>2.29"  
Flow Length=288' Tc=11.4 min CN=81 Runoff=1.84 cfs 0.146 af

**Subcatchment S-2: Flow to offsite** Runoff Area=7,368 sf 0.00% Impervious Runoff Depth>2.46"  
Flow Length=191' Tc=15.0 min CN=83 Runoff=0.39 cfs 0.035 af

**Subcatchment S-3: Flow to culvert** Runoff Area=25,964 sf 0.00% Impervious Runoff Depth>2.12"  
Flow Length=219' Slope=0.0900 '/' Tc=17.2 min CN=79 Runoff=1.14 cfs 0.106 af

**Subcatchment S-4: Flow to offsite** Runoff Area=18,586 sf 0.00% Impervious Runoff Depth>2.29"  
Flow Length=321' Tc=18.5 min CN=81 Runoff=0.86 cfs 0.081 af

**Subcatchment S5: Flow to offsite** Runoff Area=8,160 sf 0.00% Impervious Runoff Depth>3.70"  
Flow Length=102' Slope=0.0250 '/' Tc=1.2 min CN=96 Runoff=0.87 cfs 0.058 af

**Reach 1R: Roadside Ditch** Avg. Flow Depth=0.23' Max Vel=2.89 fps Inflow=1.84 cfs 0.146 af  
n=0.030 L=10.0' S=0.0330 '/' Capacity=32.03 cfs Outflow=1.84 cfs 0.146 af

**Reach AP-1: Analysis Point 1** Inflow=1.84 cfs 0.146 af  
Outflow=1.84 cfs 0.146 af

**Reach AP-2: Analysis Point 2** Inflow=0.39 cfs 0.035 af  
Outflow=0.39 cfs 0.035 af

**Reach AP-3: Analysis Point 3** Inflow=2.29 cfs 0.244 af  
Outflow=2.29 cfs 0.244 af

**Pond P-1: Culvert** Peak Elev=91.58' Storage=53 cf Inflow=1.14 cfs 0.106 af  
15.0" Round Culvert n=0.013 L=28.0' S=0.0107 '/' Outflow=1.14 cfs 0.105 af

**Total Runoff Area = 2.145 ac Runoff Volume = 0.426 af Average Runoff Depth = 2.38"**  
**100.00% Pervious = 2.145 ac 0.00% Impervious = 0.000 ac**

**Summary for Subcatchment S-1: Flow to Vernal Pool**

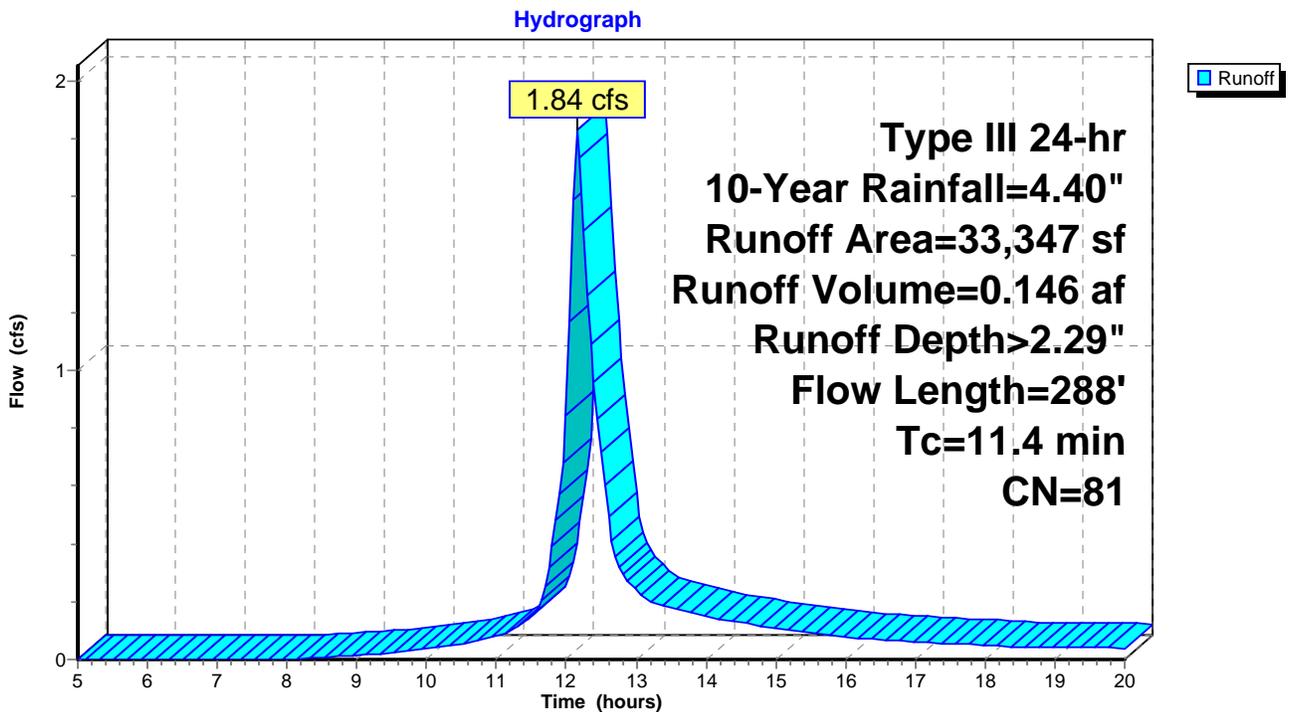
Runoff = 1.84 cfs @ 12.16 hrs, Volume= 0.146 af, Depth> 2.29"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr 10-Year Rainfall=4.40"

Area (sf)	CN	Description
26,635	79	Woods, Fair, HSG D
1,171	91	Gravel roads, HSG D
2,442	80	>75% Grass cover, Good, HSG D
3,099	98	Water Surface, 0% imp, HSG D
33,347	81	Weighted Average
33,347		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.9	150	0.0500	0.25		<b>Sheet Flow, Woods</b> Grass: Short n= 0.150 P2= 2.90"
0.1	70	0.0500	7.88	39.42	<b>Trap/Vee/Rect Channel Flow,</b> Bot.W=2.00' D=1.00' Z= 3.0 '/' Top.W=8.00' n= 0.030 Earth, grassed & winding
1.4	68	0.0260	0.81		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
11.4	288	Total			

**Subcatchment S-1: Flow to Vernal Pool**



**Summary for Subcatchment S-2: Flow to offsite**

Runoff = 0.39 cfs @ 12.21 hrs, Volume= 0.035 af, Depth> 2.46"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr 10-Year Rainfall=4.40"

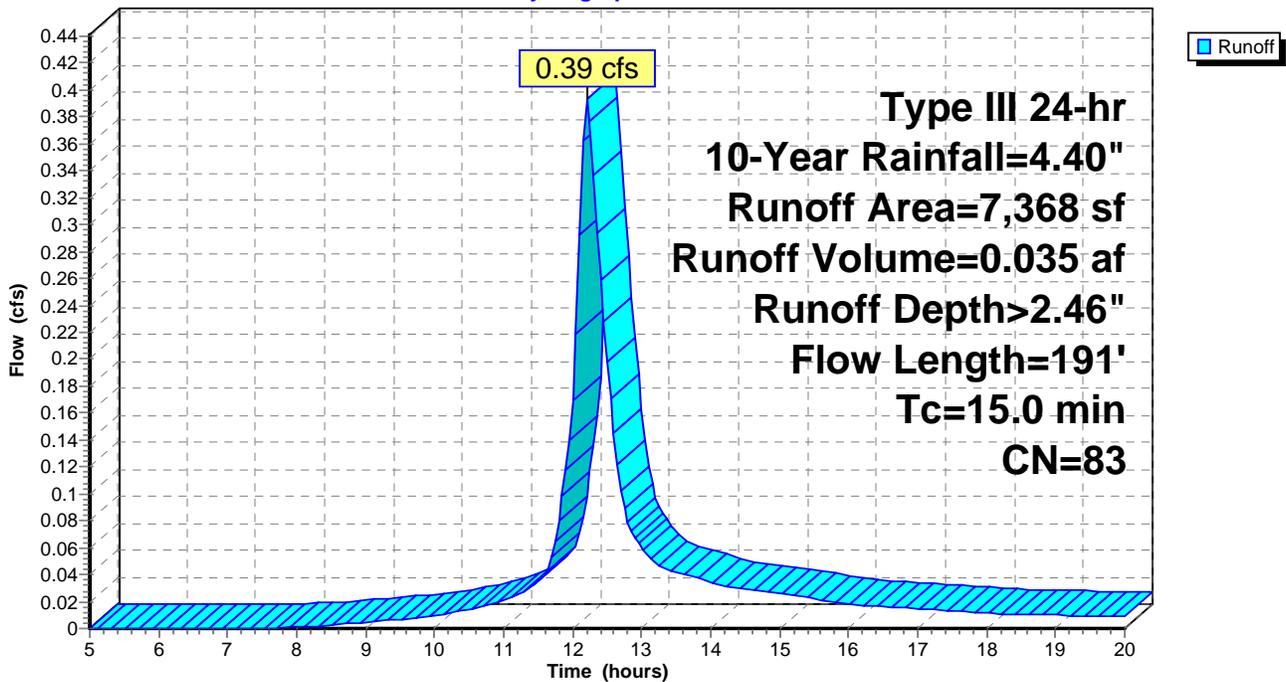
Area (sf)	CN	Description
2,261	91	Gravel roads, HSG D
2,623	80	>75% Grass cover, Good, HSG D
2,484	79	Woods, Fair, HSG D
7,368	83	Weighted Average
7,368		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.6	58	0.0200	0.07		<b>Sheet Flow, Woods</b> Woods: Light underbrush n= 0.400 P2= 2.90"
0.4	133	0.0230	5.35	26.74	<b>Trap/Vee/Rect Channel Flow,</b> Bot.W=2.00' D=1.00' Z= 3.0 '/' Top.W=8.00' n= 0.030 Earth, grassed & winding
15.0	191	Total			

**Subcatchment S-2: Flow to offsite**

Hydrograph



**Summary for Subcatchment S-3: Flow to culvert**

Runoff = 1.14 cfs @ 12.24 hrs, Volume= 0.106 af, Depth> 2.12"

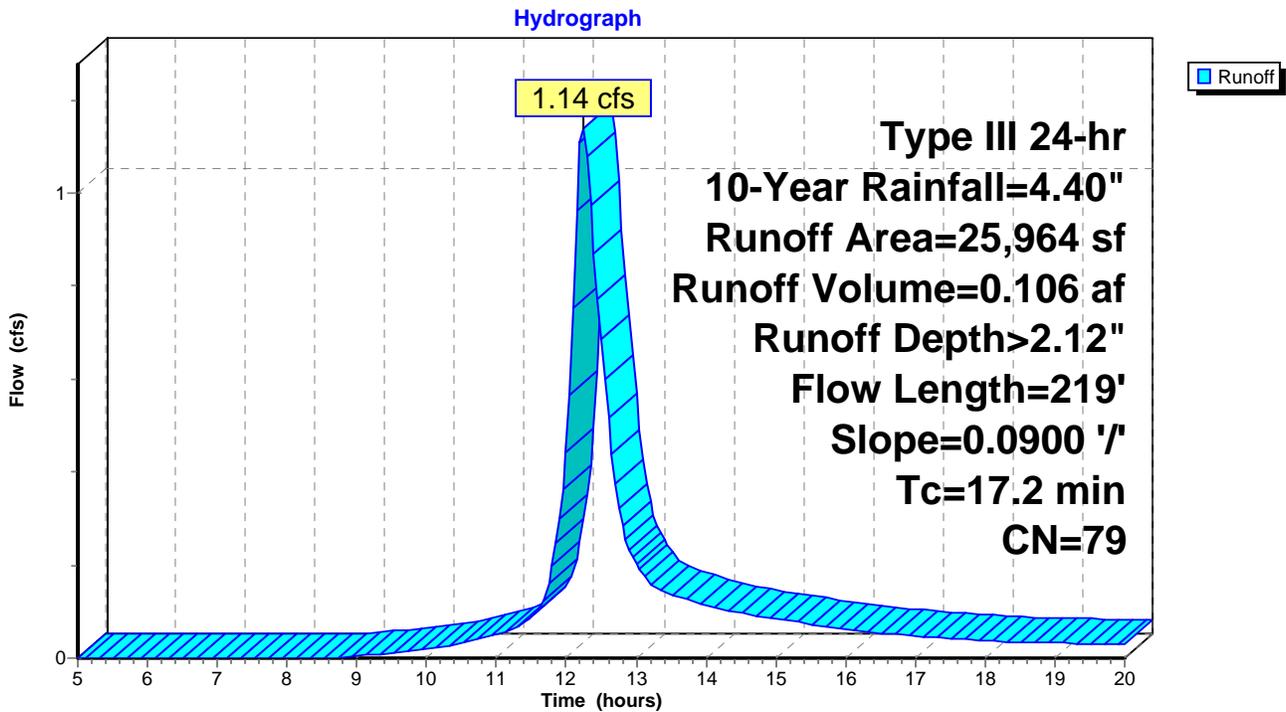
Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr 10-Year Rainfall=4.40"

Area (sf)	CN	Description
3,670	80	>75% Grass cover, Good, HSG D
22,294	79	Woods, Fair, HSG D
25,964	79	Weighted Average
25,964		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.1	150	0.0900	0.15		<b>Sheet Flow, Woods</b> Woods: Light underbrush n= 0.400 P2= 2.90"
0.1	69	0.0900	10.58	52.89	<b>Trap/Vee/Rect Channel Flow,</b> Bot.W=2.00' D=1.00' Z= 3.0 '/' Top.W=8.00' n= 0.030 Earth, grassed & winding
17.2	219	Total			

**Subcatchment S-3: Flow to culvert**



**Summary for Subcatchment S-4: Flow to offsite**

Runoff = 0.86 cfs @ 12.26 hrs, Volume= 0.081 af, Depth> 2.29"

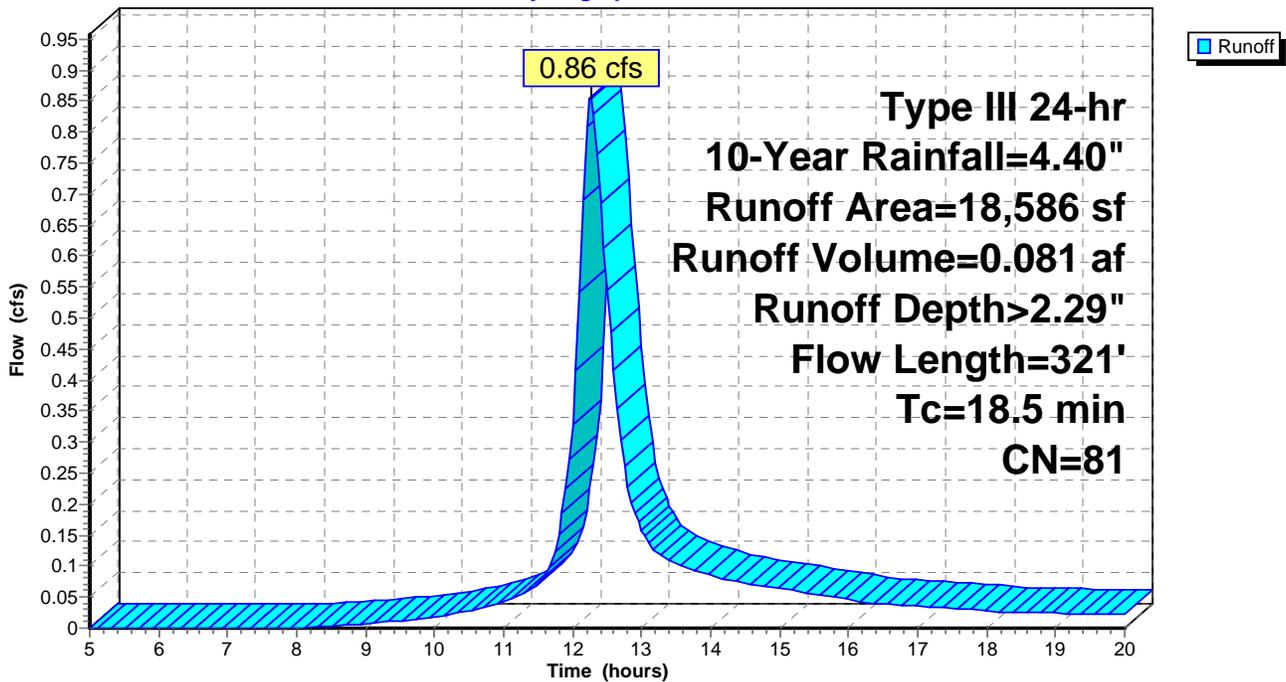
Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Type III 24-hr 10-Year Rainfall=4.40"

Area (sf)	CN	Description
6,702	80	>75% Grass cover, Good, HSG D
9,044	79	Woods, Fair, HSG D
2,840	91	Gravel roads, HSG D
18,586	81	Weighted Average
18,586		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.9	150	0.0800	0.14		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 2.90"
0.1	13	0.1000	1.58		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
0.5	158	0.0200	4.99	24.93	<b>Trap/Vee/Rect Channel Flow,</b> Bot.W=2.00' D=1.00' Z= 3.0 '/' Top.W=8.00' n= 0.030 Earth, grassed & winding
18.5	321	Total			

**Subcatchment S-4: Flow to offsite**

Hydrograph



**Summary for Subcatchment S5: Flow to offsite**

[49] Hint:  $T_c < 2dt$  may require smaller dt

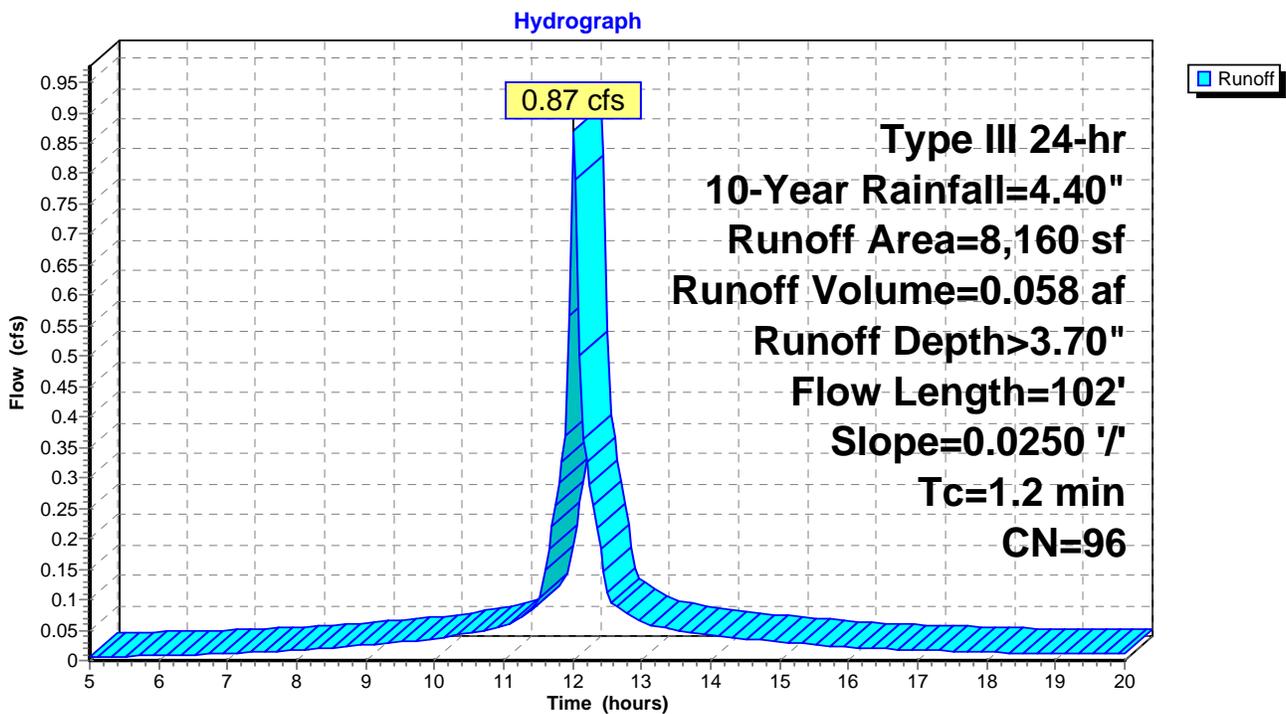
Runoff = 0.87 cfs @ 12.02 hrs, Volume= 0.058 af, Depth> 3.70"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Type III 24-hr 10-Year Rainfall=4.40"

Area (sf)	CN	Description
8,160	96	Gravel surface, HSG D
8,160		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.2	102	0.0250	1.44		Sheet Flow, Smooth surfaces n= 0.011 P2= 2.90"

**Subcatchment S5: Flow to offsite**



### Summary for Reach 1R: Roadside Ditch

Inflow Area = 0.766 ac, 0.00% Impervious, Inflow Depth > 2.29" for 10-Year event  
Inflow = 1.84 cfs @ 12.16 hrs, Volume= 0.146 af  
Outflow = 1.84 cfs @ 12.16 hrs, Volume= 0.146 af, Atten= 0%, Lag= 0.0 min

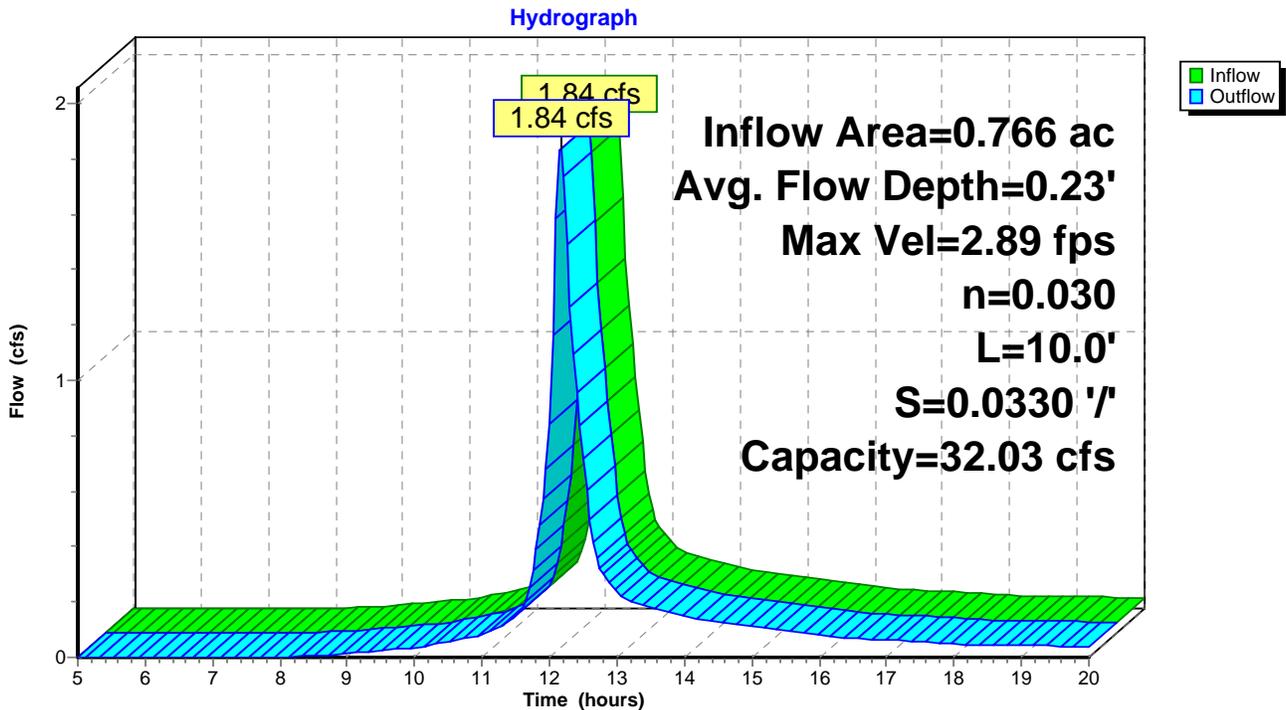
Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Max. Velocity= 2.89 fps, Min. Travel Time= 0.1 min  
Avg. Velocity = 1.02 fps, Avg. Travel Time= 0.2 min

Peak Storage= 6 cf @ 12.16 hrs  
Average Depth at Peak Storage= 0.23'  
Bank-Full Depth= 1.00' Flow Area= 5.0 sf, Capacity= 32.03 cfs

2.00' x 1.00' deep channel, n= 0.030 Earth, grassed & winding  
Side Slope Z-value= 3.0 '/ Top Width= 8.00'  
Length= 10.0' Slope= 0.0330 '/  
Inlet Invert= 101.00', Outlet Invert= 100.67'



Reach 1R: Roadside Ditch



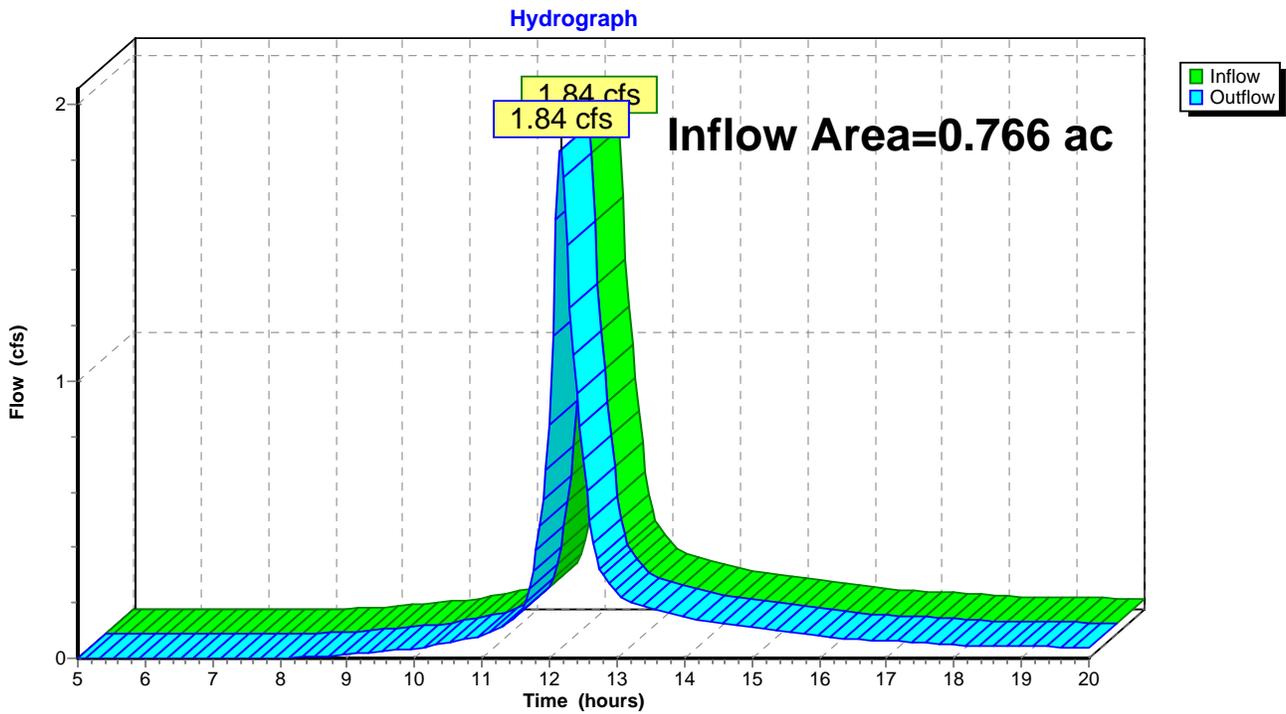
### Summary for Reach AP-1: Analysis Point 1

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.766 ac, 0.00% Impervious, Inflow Depth > 2.29" for 10-Year event  
Inflow = 1.84 cfs @ 12.16 hrs, Volume= 0.146 af  
Outflow = 1.84 cfs @ 12.16 hrs, Volume= 0.146 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

### Reach AP-1: Analysis Point 1



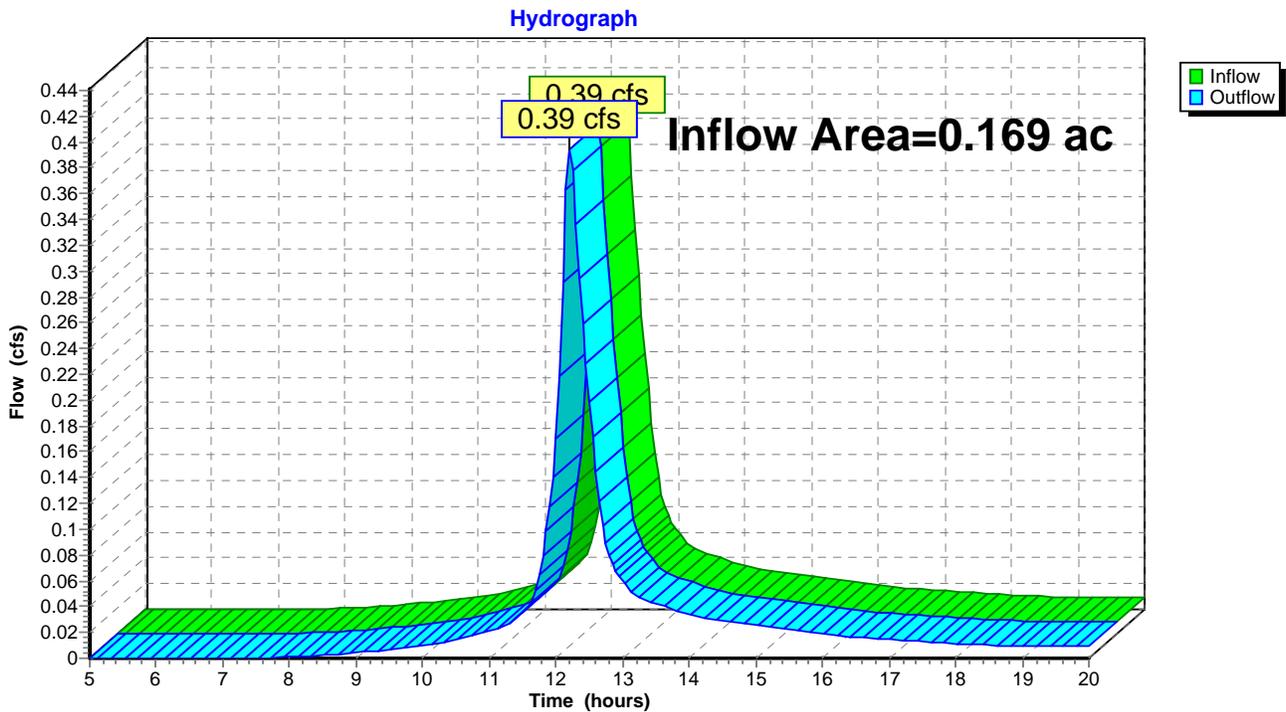
### Summary for Reach AP-2: Analysis Point 2

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.169 ac, 0.00% Impervious, Inflow Depth > 2.46" for 10-Year event  
Inflow = 0.39 cfs @ 12.21 hrs, Volume= 0.035 af  
Outflow = 0.39 cfs @ 12.21 hrs, Volume= 0.035 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

### Reach AP-2: Analysis Point 2



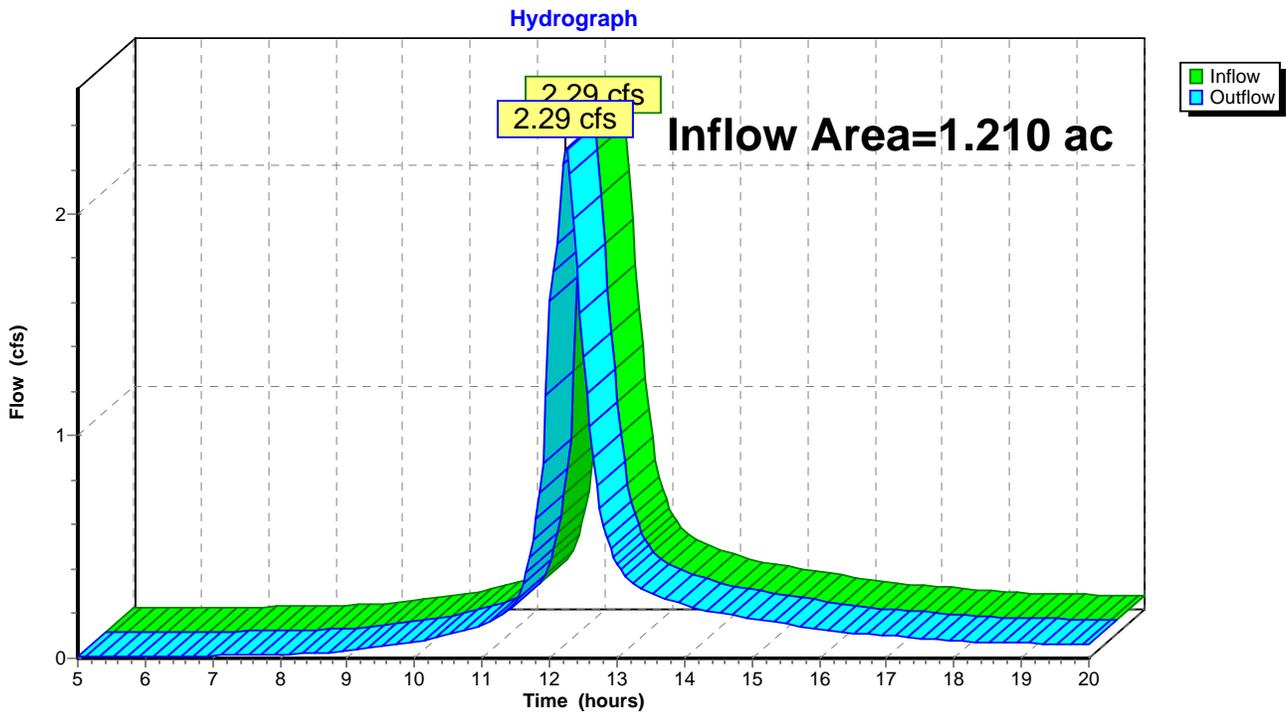
### Summary for Reach AP-3: Analysis Point 3

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.210 ac, 0.00% Impervious, Inflow Depth > 2.42" for 10-Year event  
Inflow = 2.29 cfs @ 12.24 hrs, Volume= 0.244 af  
Outflow = 2.29 cfs @ 12.24 hrs, Volume= 0.244 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

### Reach AP-3: Analysis Point 3



**Summary for Pond P-1: Culvert**

Inflow Area = 0.596 ac, 0.00% Impervious, Inflow Depth > 2.12" for 10-Year event  
 Inflow = 1.14 cfs @ 12.24 hrs, Volume= 0.106 af  
 Outflow = 1.14 cfs @ 12.25 hrs, Volume= 0.105 af, Atten= 0%, Lag= 0.6 min  
 Primary = 1.14 cfs @ 12.25 hrs, Volume= 0.105 af

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Peak Elev= 91.58' @ 12.25 hrs Surf.Area= 114 sf Storage= 53 cf  
 Flood Elev= 93.10' Surf.Area= 450 sf Storage= 406 cf

Plug-Flow detention time= 1.6 min calculated for 0.105 af (100% of inflow)  
 Center-of-Mass det. time= 1.1 min ( 803.7 - 802.6 )

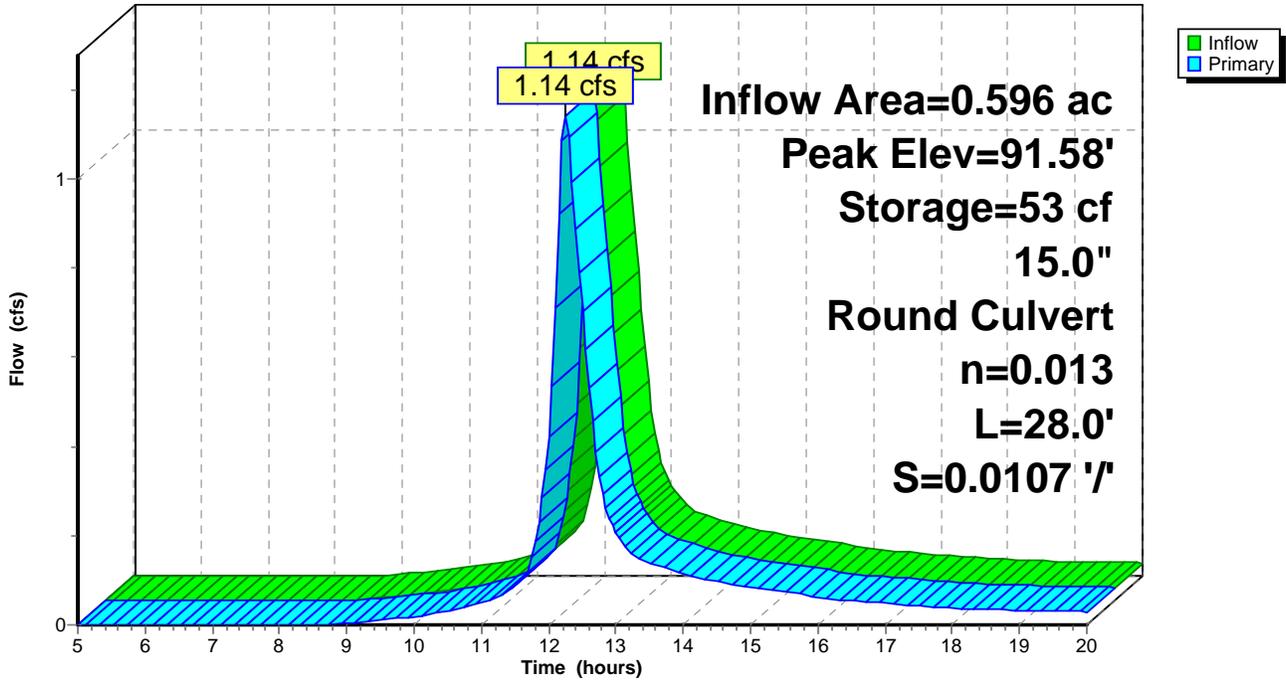
Volume	Invert	Avail.Storage	Storage Description
#1	91.00'	406 cf	<b>Culvert Inlet (Prismatic)</b> Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
91.00	70	0	0
92.00	146	108	108
93.00	450	298	406

Device	Routing	Invert	Outlet Devices
#1	Primary	91.00'	<b>15.0" Round Culvert</b> L= 28.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 91.00' / 90.70' S= 0.0107 '/' Cc= 0.900 n= 0.013, Flow Area= 1.23 sf

**Primary OutFlow** Max=1.14 cfs @ 12.25 hrs HW=91.58' TW=0.00' (Dynamic Tailwater)  
 ↑1=Culvert (Inlet Controls 1.14 cfs @ 2.05 fps)

### Pond P-1: Culvert

Hydrograph



Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points  
Runoff by SCS TR-20 method, UH=SCS  
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

**Subcatchment S-1: Flow to Vernal Pool** Runoff Area=33,347 sf 0.00% Impervious Runoff Depth>2.87"  
Flow Length=288' Tc=11.4 min CN=81 Runoff=2.29 cfs 0.183 af

**Subcatchment S-2: Flow to offsite** Runoff Area=7,368 sf 0.00% Impervious Runoff Depth>3.05"  
Flow Length=191' Tc=15.0 min CN=83 Runoff=0.49 cfs 0.043 af

**Subcatchment S-3: Flow to culvert** Runoff Area=25,964 sf 0.00% Impervious Runoff Depth>2.69"  
Flow Length=219' Slope=0.0900 '/' Tc=17.2 min CN=79 Runoff=1.44 cfs 0.133 af

**Subcatchment S-4: Flow to offsite** Runoff Area=18,586 sf 0.00% Impervious Runoff Depth>2.86"  
Flow Length=321' Tc=18.5 min CN=81 Runoff=1.07 cfs 0.102 af

**Subcatchment S5: Flow to offsite** Runoff Area=8,160 sf 0.00% Impervious Runoff Depth>4.35"  
Flow Length=102' Slope=0.0250 '/' Tc=1.2 min CN=96 Runoff=1.02 cfs 0.068 af

**Reach 1R: Roadside Ditch** Avg. Flow Depth=0.27' Max Vel=3.09 fps Inflow=2.29 cfs 0.183 af  
n=0.030 L=10.0' S=0.0330 '/' Capacity=32.03 cfs Outflow=2.29 cfs 0.183 af

**Reach AP-1: Analysis Point 1** Inflow=2.29 cfs 0.183 af  
Outflow=2.29 cfs 0.183 af

**Reach AP-2: Analysis Point 2** Inflow=0.49 cfs 0.043 af  
Outflow=0.49 cfs 0.043 af

**Reach AP-3: Analysis Point 3** Inflow=2.85 cfs 0.303 af  
Outflow=2.85 cfs 0.303 af

**Pond P-1: Culvert** Peak Elev=91.66' Storage=63 cf Inflow=1.44 cfs 0.133 af  
15.0" Round Culvert n=0.013 L=28.0' S=0.0107 '/' Outflow=1.44 cfs 0.133 af

**Total Runoff Area = 2.145 ac Runoff Volume = 0.529 af Average Runoff Depth = 2.96"**  
**100.00% Pervious = 2.145 ac 0.00% Impervious = 0.000 ac**

**Summary for Subcatchment S-1: Flow to Vernal Pool**

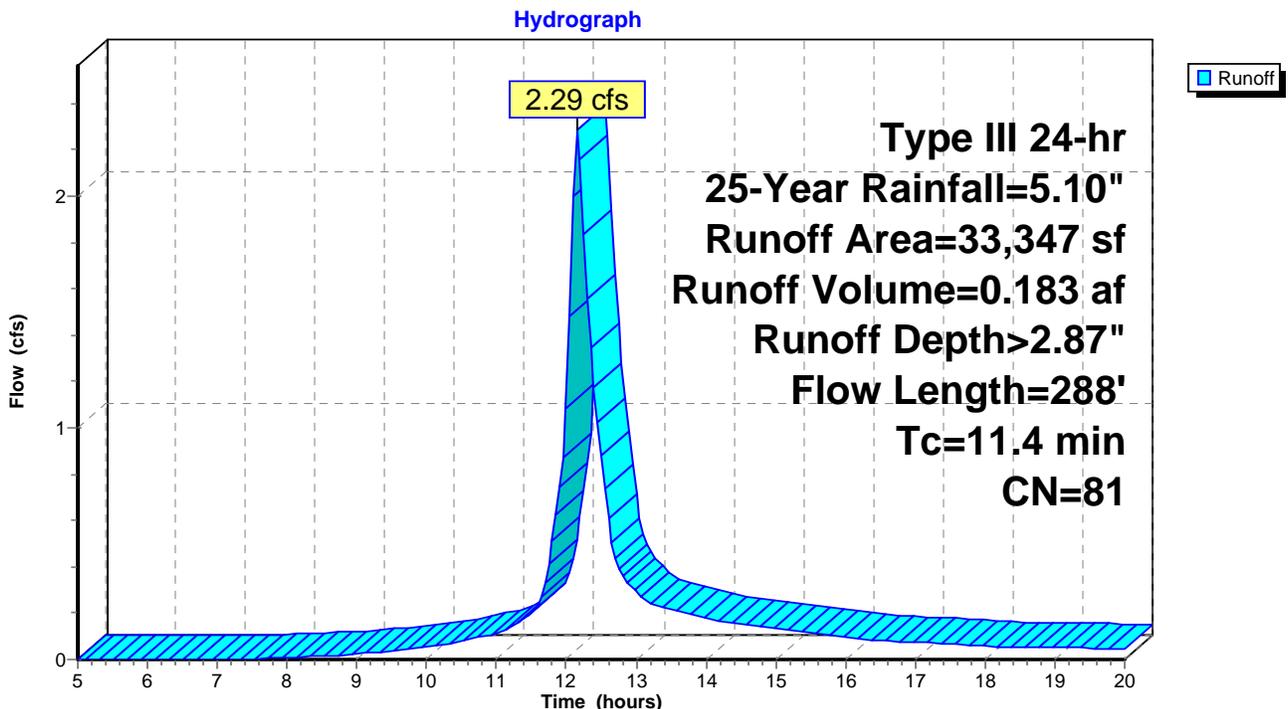
Runoff = 2.29 cfs @ 12.16 hrs, Volume= 0.183 af, Depth> 2.87"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr 25-Year Rainfall=5.10"

Area (sf)	CN	Description
26,635	79	Woods, Fair, HSG D
1,171	91	Gravel roads, HSG D
2,442	80	>75% Grass cover, Good, HSG D
3,099	98	Water Surface, 0% imp, HSG D
33,347	81	Weighted Average
33,347		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.9	150	0.0500	0.25		<b>Sheet Flow, Woods</b> Grass: Short n= 0.150 P2= 2.90"
0.1	70	0.0500	7.88	39.42	<b>Trap/Vee/Rect Channel Flow,</b> Bot.W=2.00' D=1.00' Z= 3.0'/' Top.W=8.00' n= 0.030 Earth, grassed & winding
1.4	68	0.0260	0.81		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
11.4	288	Total			

**Subcatchment S-1: Flow to Vernal Pool**



**Summary for Subcatchment S-2: Flow to offsite**

Runoff = 0.49 cfs @ 12.21 hrs, Volume= 0.043 af, Depth> 3.05"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr 25-Year Rainfall=5.10"

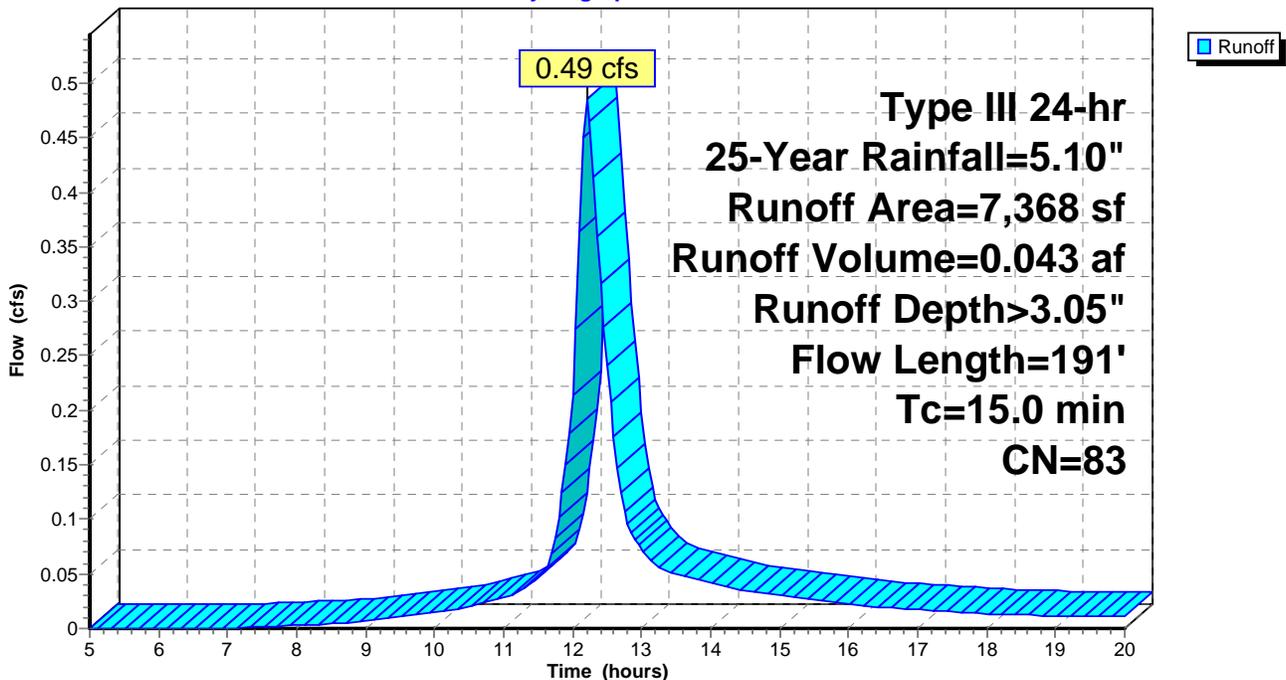
Area (sf)	CN	Description
2,261	91	Gravel roads, HSG D
2,623	80	>75% Grass cover, Good, HSG D
2,484	79	Woods, Fair, HSG D
7,368	83	Weighted Average
7,368		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.6	58	0.0200	0.07		<b>Sheet Flow, Woods</b> Woods: Light underbrush n= 0.400 P2= 2.90"
0.4	133	0.0230	5.35	26.74	<b>Trap/Vee/Rect Channel Flow,</b> Bot.W=2.00' D=1.00' Z= 3.0 '/' Top.W=8.00' n= 0.030 Earth, grassed & winding
15.0	191	Total			

**Subcatchment S-2: Flow to offsite**

Hydrograph



**Summary for Subcatchment S-3: Flow to culvert**

Runoff = 1.44 cfs @ 12.24 hrs, Volume= 0.133 af, Depth> 2.69"

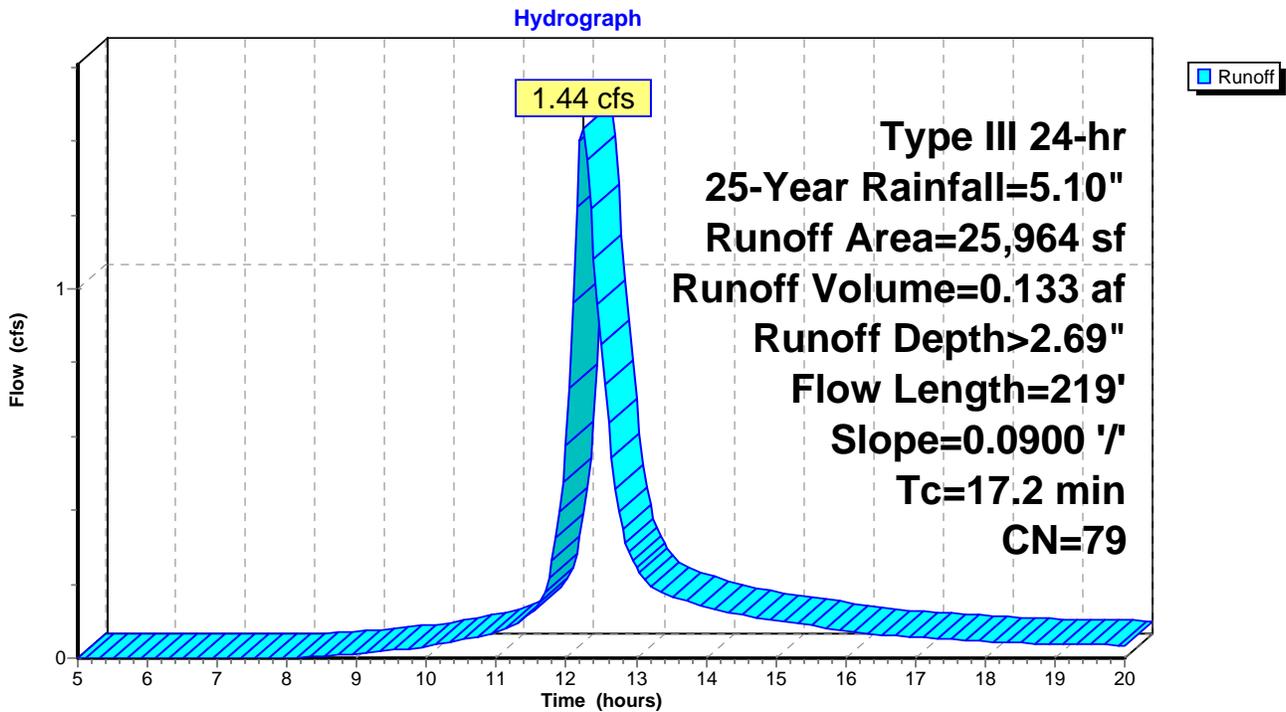
Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Type III 24-hr 25-Year Rainfall=5.10"

Area (sf)	CN	Description
3,670	80	>75% Grass cover, Good, HSG D
22,294	79	Woods, Fair, HSG D
25,964	79	Weighted Average
25,964		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.1	150	0.0900	0.15		<b>Sheet Flow, Woods</b> Woods: Light underbrush n= 0.400 P2= 2.90"
0.1	69	0.0900	10.58	52.89	<b>Trap/Vee/Rect Channel Flow,</b> Bot.W=2.00' D=1.00' Z= 3.0 '/' Top.W=8.00' n= 0.030 Earth, grassed & winding
17.2	219	Total			

**Subcatchment S-3: Flow to culvert**



**Summary for Subcatchment S-4: Flow to offsite**

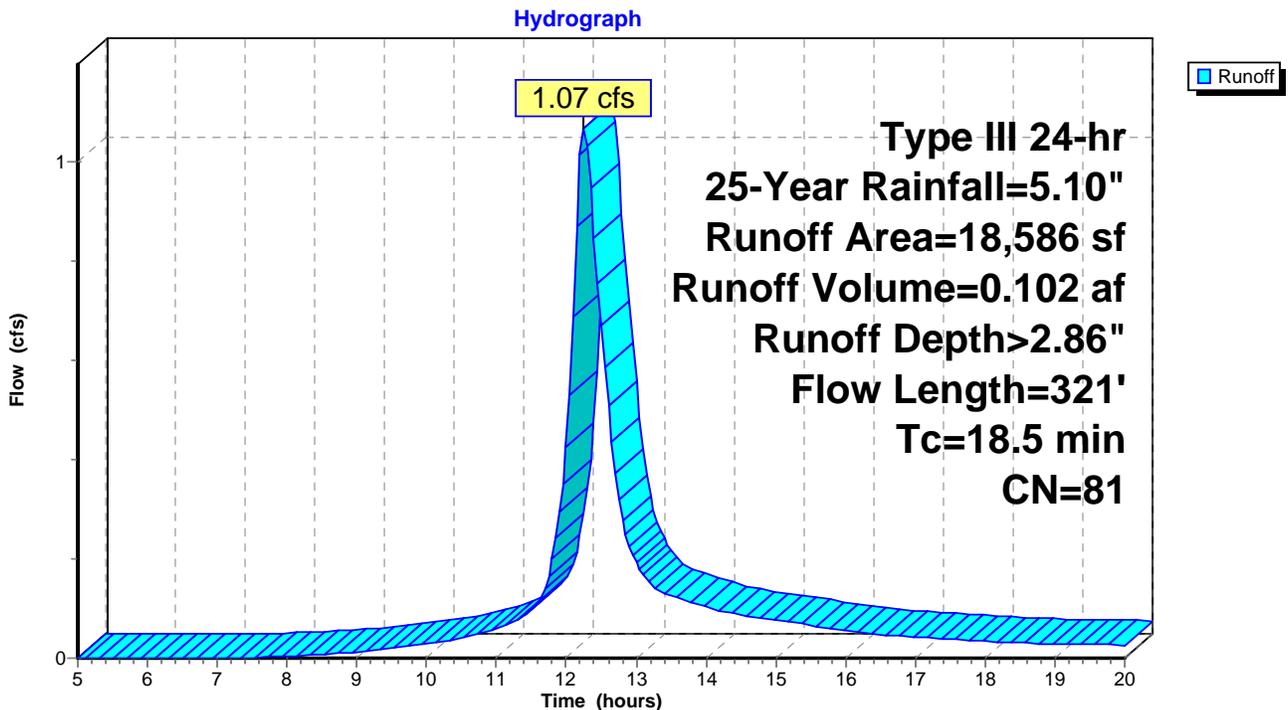
Runoff = 1.07 cfs @ 12.26 hrs, Volume= 0.102 af, Depth> 2.86"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Type III 24-hr 25-Year Rainfall=5.10"

Area (sf)	CN	Description
6,702	80	>75% Grass cover, Good, HSG D
9,044	79	Woods, Fair, HSG D
2,840	91	Gravel roads, HSG D
18,586	81	Weighted Average
18,586		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.9	150	0.0800	0.14		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 2.90"
0.1	13	0.1000	1.58		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
0.5	158	0.0200	4.99	24.93	<b>Trap/Vee/Rect Channel Flow,</b> Bot.W=2.00' D=1.00' Z= 3.0 '/' Top.W=8.00' n= 0.030 Earth, grassed & winding
18.5	321	Total			

**Subcatchment S-4: Flow to offsite**



**Summary for Subcatchment S5: Flow to offsite**

[49] Hint:  $T_c < 2dt$  may require smaller dt

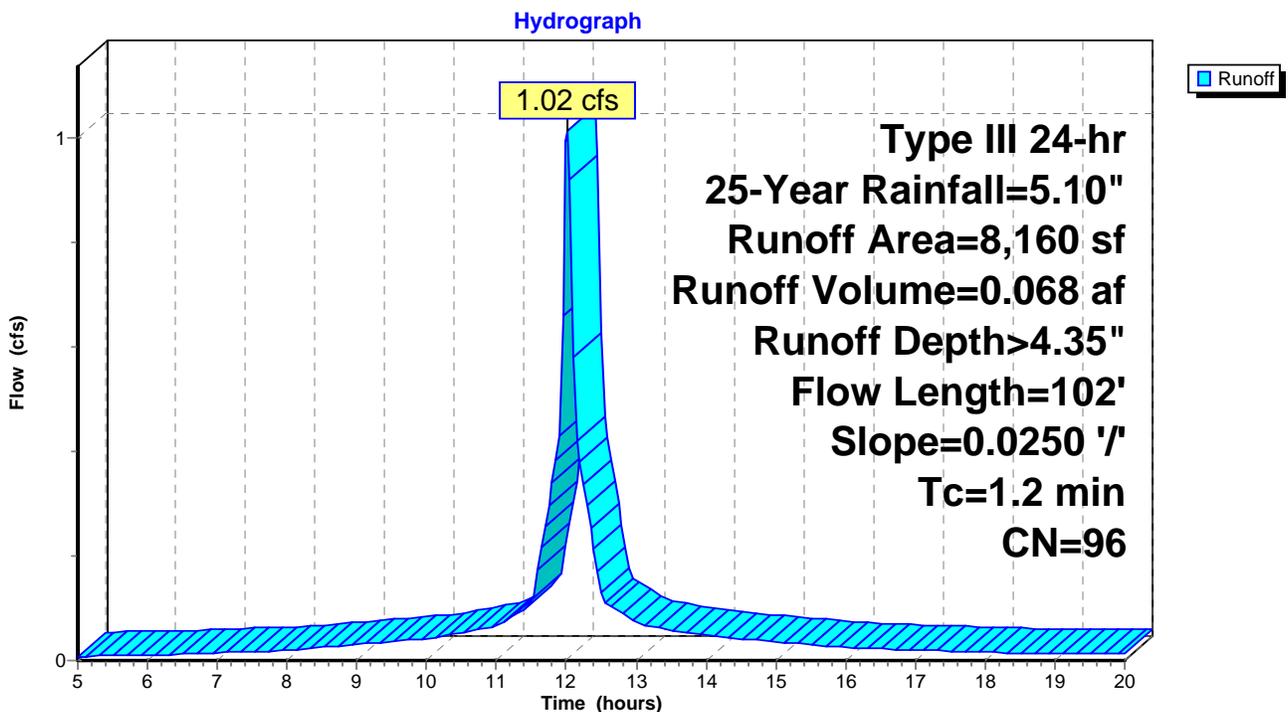
Runoff = 1.02 cfs @ 12.02 hrs, Volume= 0.068 af, Depth> 4.35"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr 25-Year Rainfall=5.10"

Area (sf)	CN	Description
8,160	96	Gravel surface, HSG D
8,160		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.2	102	0.0250	1.44		Sheet Flow, Smooth surfaces n= 0.011 P2= 2.90"

**Subcatchment S5: Flow to offsite**



**Summary for Reach 1R: Roadside Ditch**

Inflow Area = 0.766 ac, 0.00% Impervious, Inflow Depth > 2.87" for 25-Year event  
Inflow = 2.29 cfs @ 12.16 hrs, Volume= 0.183 af  
Outflow = 2.29 cfs @ 12.16 hrs, Volume= 0.183 af, Atten= 0%, Lag= 0.0 min

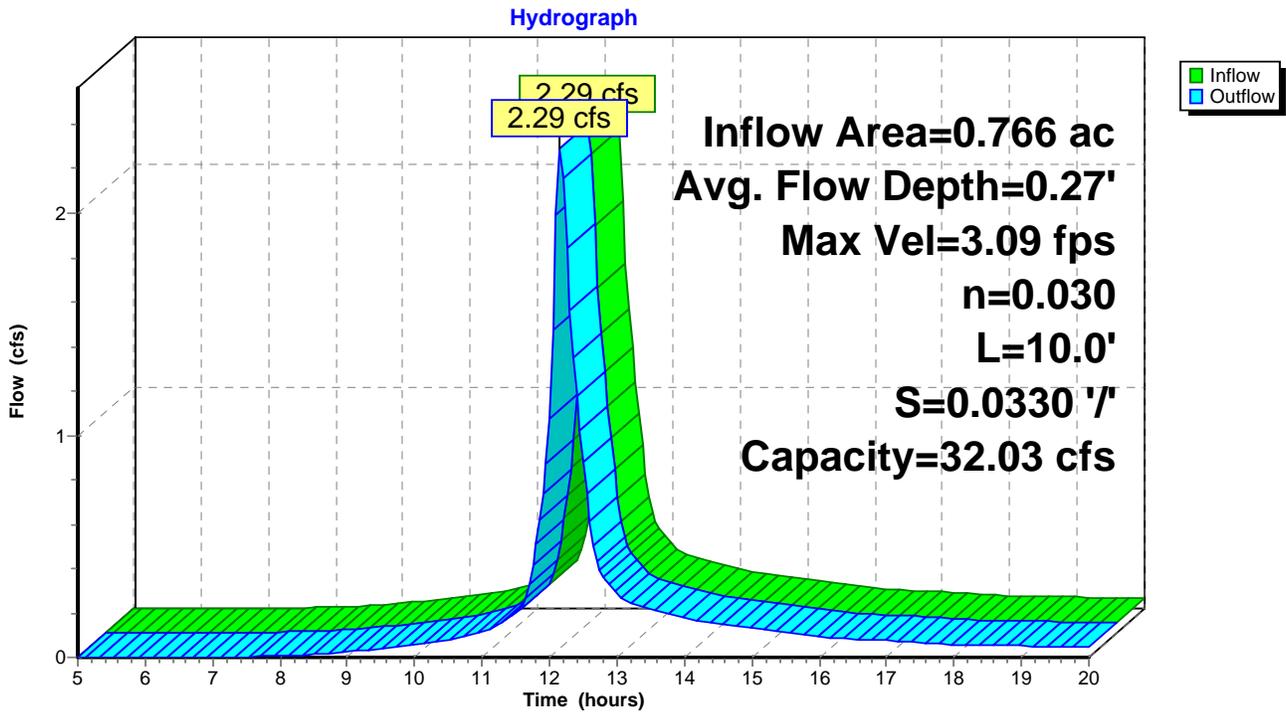
Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Max. Velocity= 3.09 fps, Min. Travel Time= 0.1 min  
Avg. Velocity = 1.08 fps, Avg. Travel Time= 0.2 min

Peak Storage= 7 cf @ 12.16 hrs  
Average Depth at Peak Storage= 0.27'  
Bank-Full Depth= 1.00' Flow Area= 5.0 sf, Capacity= 32.03 cfs

2.00' x 1.00' deep channel, n= 0.030 Earth, grassed & winding  
Side Slope Z-value= 3.0 '/ Top Width= 8.00'  
Length= 10.0' Slope= 0.0330 '/  
Inlet Invert= 101.00', Outlet Invert= 100.67'



**Reach 1R: Roadside Ditch**



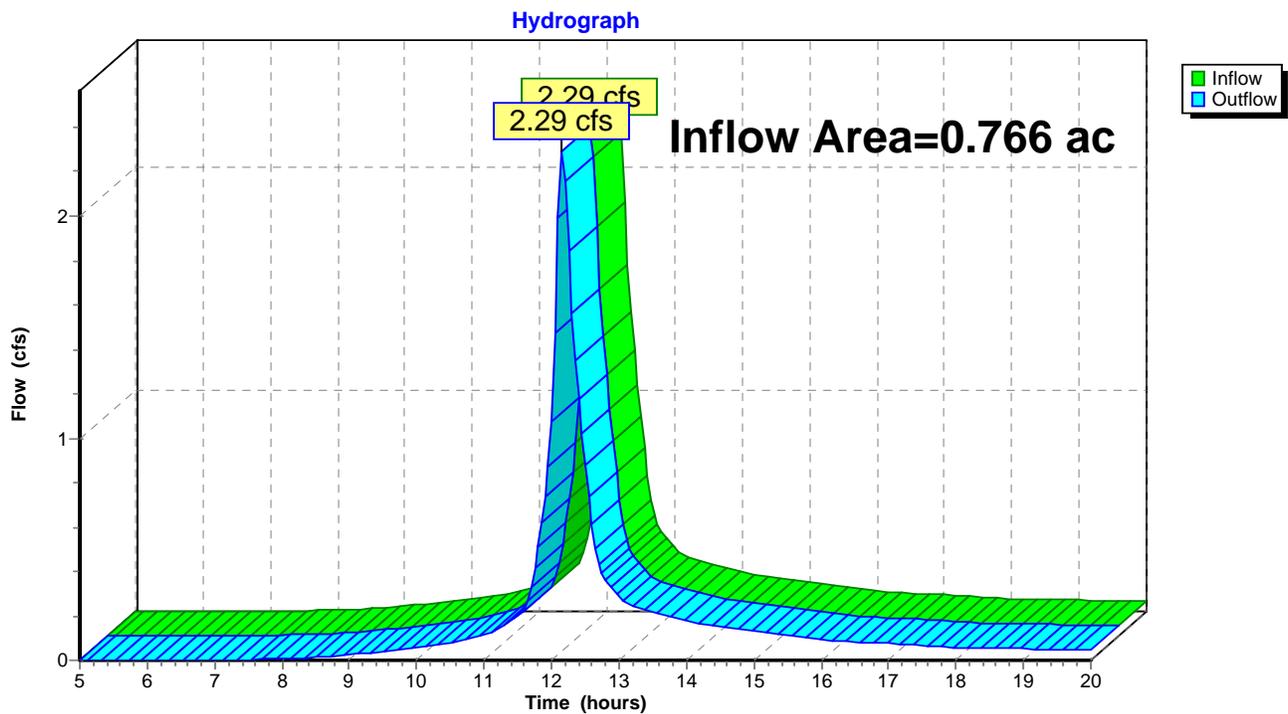
### Summary for Reach AP-1: Analysis Point 1

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.766 ac, 0.00% Impervious, Inflow Depth > 2.87" for 25-Year event  
Inflow = 2.29 cfs @ 12.16 hrs, Volume= 0.183 af  
Outflow = 2.29 cfs @ 12.16 hrs, Volume= 0.183 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

### Reach AP-1: Analysis Point 1



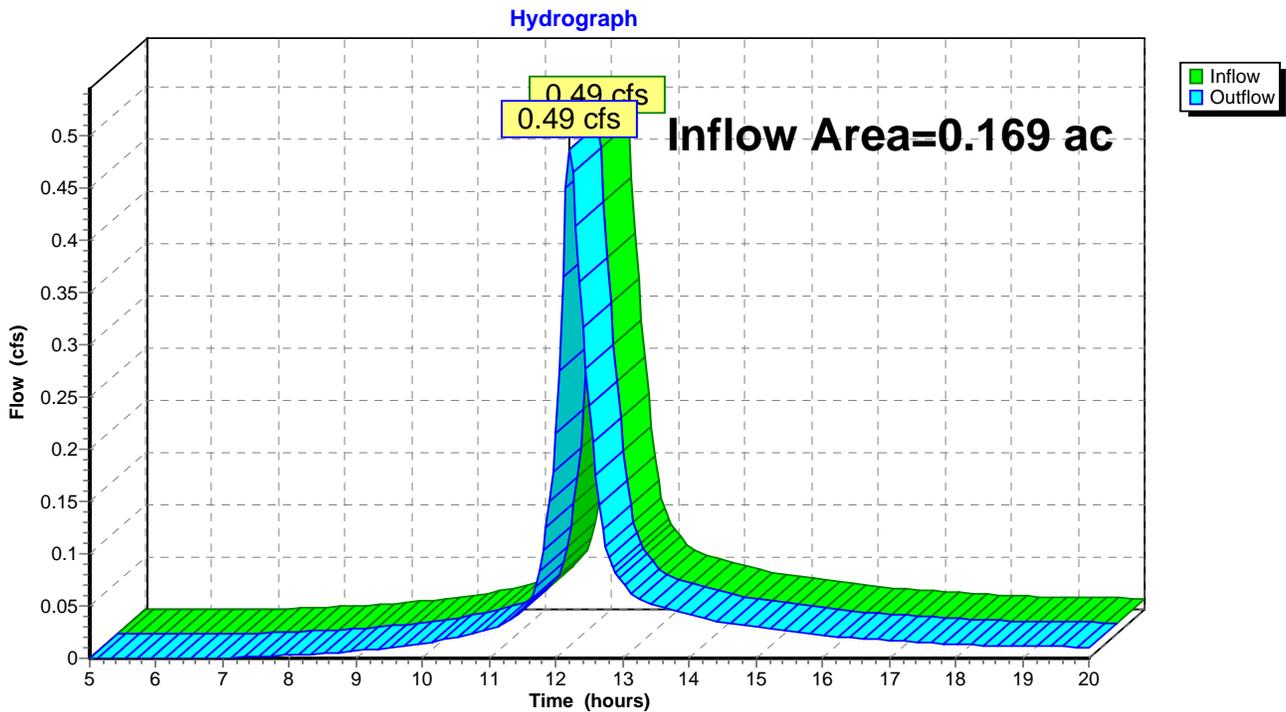
### Summary for Reach AP-2: Analysis Point 2

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.169 ac, 0.00% Impervious, Inflow Depth > 3.05" for 25-Year event  
Inflow = 0.49 cfs @ 12.21 hrs, Volume= 0.043 af  
Outflow = 0.49 cfs @ 12.21 hrs, Volume= 0.043 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

### Reach AP-2: Analysis Point 2



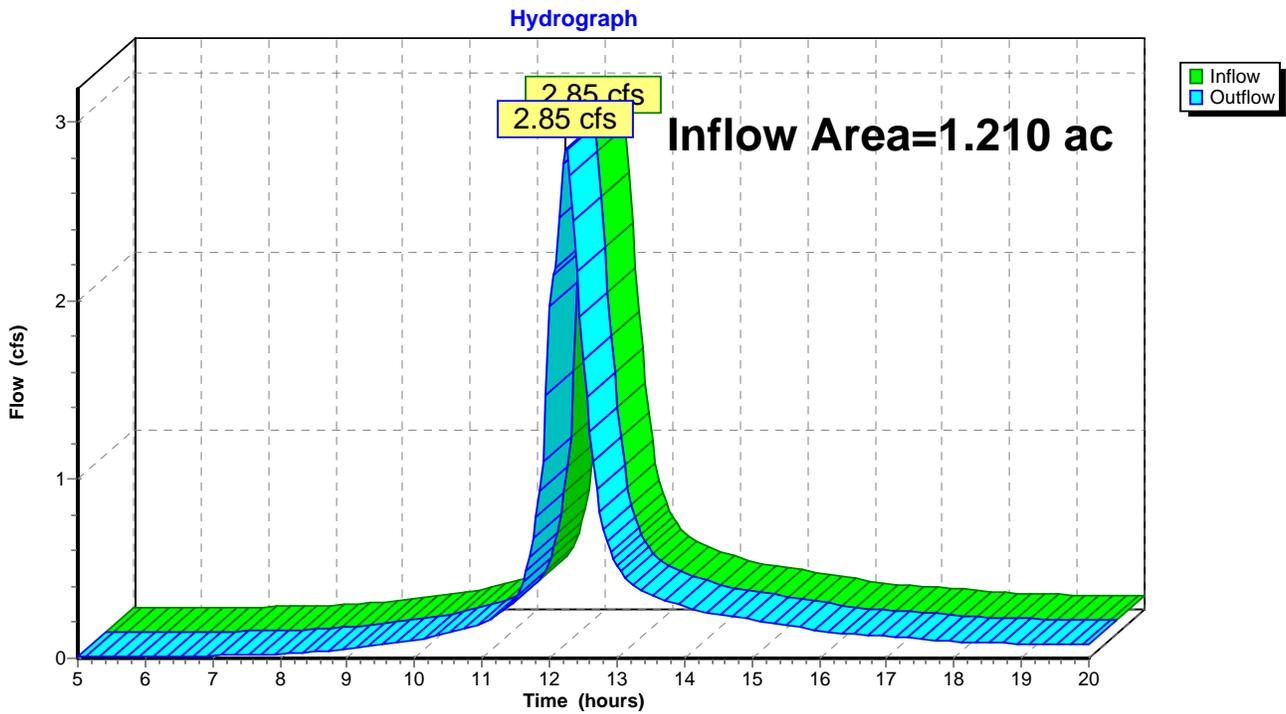
### Summary for Reach AP-3: Analysis Point 3

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.210 ac, 0.00% Impervious, Inflow Depth > 3.00" for 25-Year event  
Inflow = 2.85 cfs @ 12.24 hrs, Volume= 0.303 af  
Outflow = 2.85 cfs @ 12.24 hrs, Volume= 0.303 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

### Reach AP-3: Analysis Point 3



**Summary for Pond P-1: Culvert**

Inflow Area = 0.596 ac, 0.00% Impervious, Inflow Depth > 2.69" for 25-Year event  
 Inflow = 1.44 cfs @ 12.24 hrs, Volume= 0.133 af  
 Outflow = 1.44 cfs @ 12.25 hrs, Volume= 0.133 af, Atten= 0%, Lag= 0.6 min  
 Primary = 1.44 cfs @ 12.25 hrs, Volume= 0.133 af

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Peak Elev= 91.66' @ 12.25 hrs Surf.Area= 120 sf Storage= 63 cf  
 Flood Elev= 93.10' Surf.Area= 450 sf Storage= 406 cf

Plug-Flow detention time= 1.5 min calculated for 0.133 af (100% of inflow)  
 Center-of-Mass det. time= 1.0 min ( 798.4 - 797.3 )

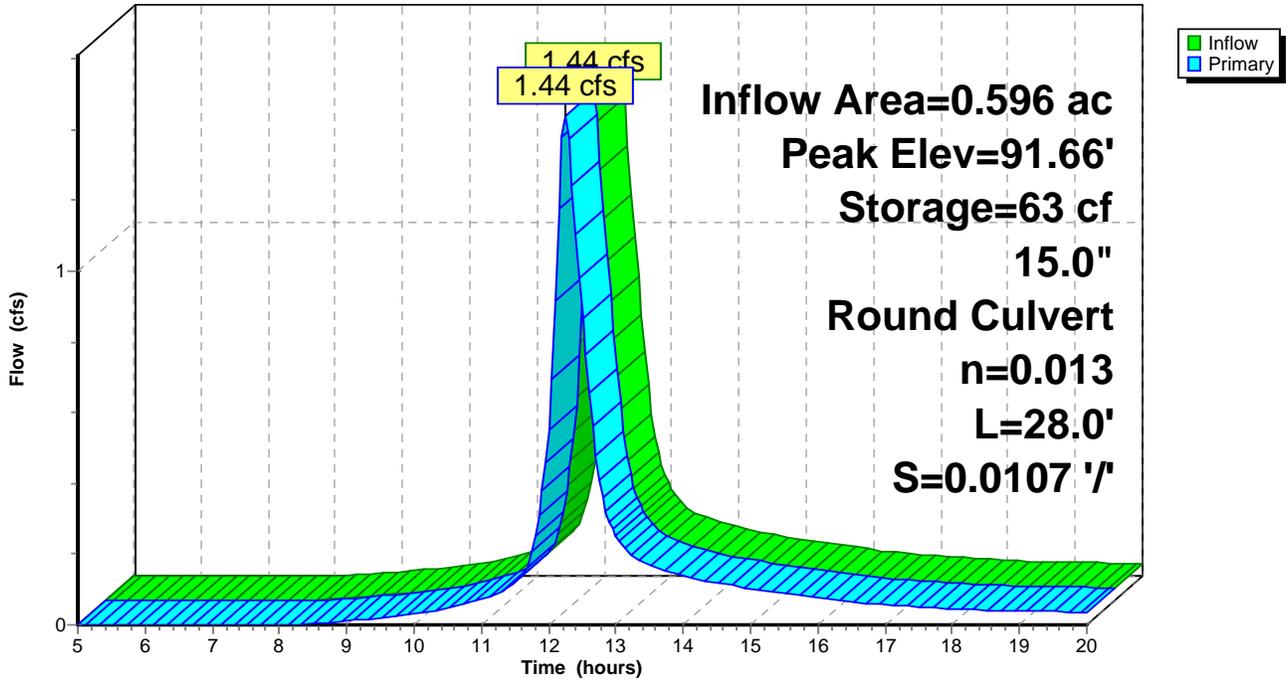
Volume	Invert	Avail.Storage	Storage Description
#1	91.00'	406 cf	<b>Culvert Inlet (Prismatic)</b> Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
91.00	70	0	0
92.00	146	108	108
93.00	450	298	406

Device	Routing	Invert	Outlet Devices
#1	Primary	91.00'	<b>15.0" Round Culvert</b> L= 28.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 91.00' / 90.70' S= 0.0107 ' /' Cc= 0.900 n= 0.013, Flow Area= 1.23 sf

**Primary OutFlow** Max=1.44 cfs @ 12.25 hrs HW=91.66' TW=0.00' (Dynamic Tailwater)  
 ↑**1=Culvert** (Inlet Controls 1.44 cfs @ 2.19 fps)

**Pond P-1: Culvert**

Hydrograph

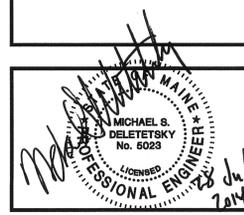




**Pre Development Drainage Plan/  
Post Development Drainage Plan**

PROJECT COORDINATION BY:

SURVEYOR



PROJECT NO: 3618148350

DRAWN BY: CBM

RELEASED BY: MSD

SUBMITTALS

▲	07/28/14	FOR TOWN SUBMISSION
▲	07/18/14	FOR TOWN SUBMISSION

BOOTHBAY

OCEAN POINT ROAD  
BOOTHBAY, ME 04537  
LINCOLN COUNTY

SHEET TITLE

PRE DEVELOPMENT  
DRAINAGE PLAN

SHEET NUMBER

DR-101



**LEGEND**

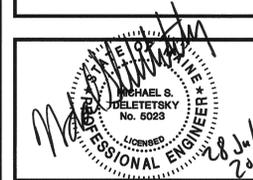
- PROPERTY LINE
- - - ABUTTING PROPERTY LINE
- IRON PIN FOUND (AS NOTED)
- UTILITY POLE
- - - 786 EXISTING CONTOUR
- STONE WALL
- ~ ~ ~ EXISTING TREE LINE
- - - < TIME OF CONCENTRATION
- SUBCATCHMENT
- (S-1) SUBCATCHMENT ID
- (AP-3) ANALYSIS POINT

1 DR-101 PRE DEVELOPMENT DRAINAGE PLAN  
SCALE: 1" = 40'

GRAPHIC SCALE  
( IN FEET )  
1 inch = 40 ft.

PROJECT COORDINATION BY:

SURVEYOR



PROJECT NO: 3618148350

DRAWN BY: CBM

RELEASED BY: MSD

SUBMITTALS

07/28/14 FOR TOWN SUBMISSION  
07/16/14 FOR TOWN SUBMISSION

BOOTHBAY

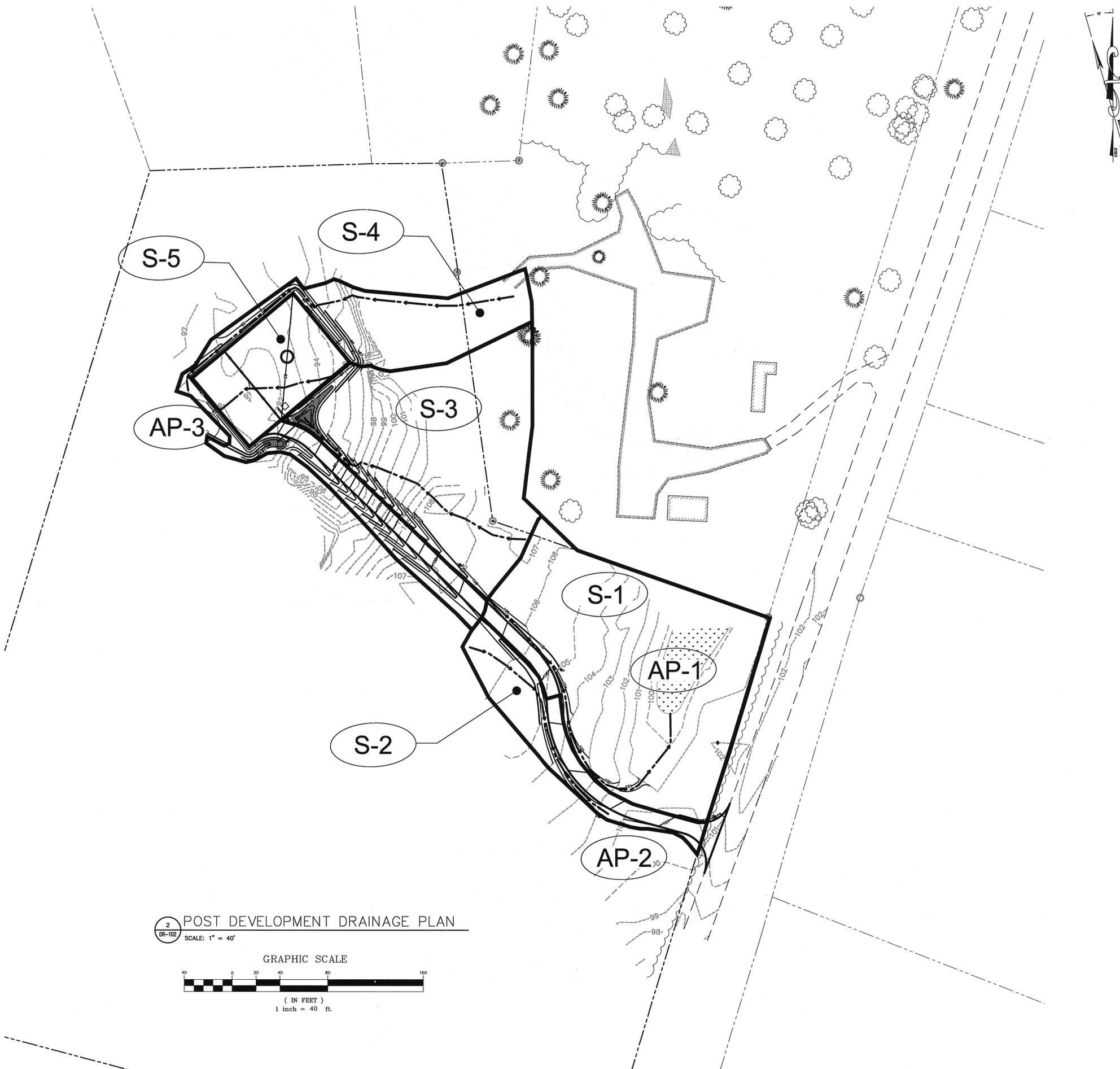
OCEAN POINT ROAD  
BOOTHBAY, ME 04537  
LINCOLN COUNTY

SHEET TITLE

POST DEVELOPMENT  
DRAINAGE PLAN

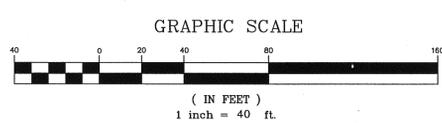
SHEET NUMBER

DR-102



LEGEND	
	PROPERTY LINE
	ABUTTING PROPERTY LINE
	IRON PIN FOUND (AS NOTED)
	UTILITY POLE
	EXISTING CONTOUR
	STONE WALL
	EXISTING TREE LINE
	TIME OF CONCENTRATION
	SUBCATCHMENT
	SUBCATCHMENT ID
	ANALYSIS POINT

2  
DR-102 POST DEVELOPMENT DRAINAGE PLAN  
SCALE: 1" = 40'



## Crystal Derocher

---

From: Jeffrey Preble  
Sent: Tuesday, July 29, 2014 4:25 PM  
To: 'Watts, Jerome B'; Abbott, Caitlyn; Louis Vitali  
Cc: James Chaousis (townmanager@townofboothbay.org); sdaggett@jbgh.com  
Subject: RE: Boothbay Tower - Updated Stormwater Report

Thanks Jerry – this is sufficient.

Jeff

---

From: Watts, Jerome B [<mailto:Jerome.Watts@amec.com>]  
Sent: Tuesday, July 29, 2014 4:03 PM  
To: Jeffrey Preble; Abbott, Caitlyn; Louis Vitali  
Cc: James Chaousis ([townmanager@townofboothbay.org](mailto:townmanager@townofboothbay.org)); [sdaggett@jbgh.com](mailto:sdaggett@jbgh.com)  
Subject: RE: Boothbay Tower - Updated Stormwater Report

Jeff

Caitlyn is on assignment in NY and will have sporadic email capabilities for the remainder of week. The following is my brief response:

The original drainage report dated July 18<sup>th</sup> established existing Sub Catchment areas S – 1 and S - 3 extending too far into the neighboring parcel to the northeast side of this site. Upon reviewing some existing survey field locations w/elevations within this vicinity, we revised the catchment areas with shorter paths (less area) in the storm water report dated July 28<sup>th</sup>. I believe it shortened the length-route by about 40 feet.

Should you have any questions, please feel free to call.

Regards  
Jerry

**Jerome B. Watts, PLS**  
**Survey Manager**  
**AMEC Environment & Infrastructure**  
**511 Congress Street**  
**Portland, Maine 04101**  
**General office Tel: 207-775-5401 Fax: 207-772-4762**  
**Direct Tel: 207-828-2619 Cell: 207-699-9811**  
**E-Mail: [jerome.watts@amec.com](mailto:jerome.watts@amec.com)**  
**Corporate Web: [www.amec.com](http://www.amec.com)**  
**Building and Engineering Services**

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---

From: Jeffrey Preble [<mailto:jeff.preble@wright-pierce.com>]  
Sent: Tuesday, July 29, 2014 8:03 AM  
To: Abbott, Caitlyn; Louis Vitali

Cc: Watts, Jerome B; James Chaousis ([townmanager@townofboothbay.org](mailto:townmanager@townofboothbay.org)); [sdaggett@jbgh.com](mailto:sdaggett@jbgh.com)  
Subject: RE: Boothbay Tower - Updated Stormwater Report

Caitlyn,

Can you send me a quick summary on the reduction in the watershed areas from the original July 18 calculations. I think you mentioned it was based on field observations or some other field evidence. I'd just like that documented for the record. Thanks,

Jeff

---

From: Abbott, Caitlyn [<mailto:caitlyn.abbott@amec.com>]  
Sent: Monday, July 28, 2014 12:15 PM  
To: Jeffrey Preble; Louis Vitali  
Cc: Watts, Jerome B; James Chaousis ([townmanager@townofboothbay.org](mailto:townmanager@townofboothbay.org)); [sdaggett@jbgh.com](mailto:sdaggett@jbgh.com)  
Subject: Boothbay Tower - Updated Stormwater Report

All,

Please find attached the Stormwater Management Report for the Boothbay Tower Site. The updates incorporate the comments from Jeffrey Preble in his July 22, 2014 letter addressed to Jim Chaousis (attached). It appears that conditions have improved.

Let us know if you have any questions or concerns.

Thank you,  
Caitlyn

Caitlyn Abbott | Civil Engineer  
*AMEC Environment & Infrastructure, Inc.*  
511 Congress Street | Portland, Maine | 04101  
Office (207) 828-2601 | Fax (207) 774-1246  
E-Mail: [caitlyn.abbott@amec.com](mailto:caitlyn.abbott@amec.com)  
Corporate Web: [www.amec.com](http://www.amec.com)  
Building and Engineering Services: [Website](#)

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EXHIBIT 3  
Wetlands Delineation Report



3618148350

June 17, 2014

Louis Vitali  
President  
Mariner Tower  
P.O. Box 2600  
Kennebunkport, Maine 04046

**Subject: Vernal Pool Survey Report  
Mariner Tower – Boothbay  
Boothbay, Maine**

Dear Louis,

AMEC Environment & Infrastructure, Inc. (AMEC) provided wetland delineation services for the 8.8 acre property (Map R9, Lot 12-A) located on Ocean Point Road (Route 96) in Boothbay, Maine, for a proposed cell phone tower. The proposed cell tower site will be accessed via a 30 foot wide right-of-way off of Ocean Point Road. Wetland delineation services included flagging wetland boundaries observed on the property in proximity to the proposed cell tower access road and tower site, as well as identification of potential vernal pools.

The proposed access road and cell tower site had been preliminarily laid out, prior to conducting the wetland delineation work. The access road cuts across the property in a northwesterly direction to the proposed cell tower site, which is approximately 450 feet from Ocean Point Road. AMEC initially visited the property on March 25, 2014. The objective of the initial site visit was to conduct a reconnaissance of the proposed access road and cell tower site in order to determine if wetlands or vernal pools exist in close proximity to the proposed development.

During the initial site reconnaissance we identified an isolated wetland (potential vernal pool) partially located on the property in the front northeastern corner of the property. The portion of the potential vernal pool (PVP) on the property is approximately 110 feet long and 50 feet wide, at its widest point, which is at the property line. The PVP had ponded water to a depth of approximately 2 feet at its deepest point. The PVP is vegetated with shrubs and herbaceous vegetation including, willow (*Salix* sp.), meadow sweet (*Spirea latifolia*), winterberry (*Ilex verticillata*), sedges (*Carex* sp.) and woolgrass (*Scirpus cyperinus*). The pool also included cinnamon fern (*Osmundastrum cinnamomeum*) and ostrich fern (*Matteuccia struthiopteris*) along its boundaries. Meadow sweet dominated the northern end of the PVP. Deadfall (woody debris) and sphagnum moss was also observed in the PVP. The soils in the PVP are composed of a 6 inch fibric organic horizon overlying a brown gravelly sandy loam. Refusal was

at 14 inches and it was presumed to be bedrock, based on the surrounding outcrops observed in close proximity to the PVP.

In order to determine if the PVP is functioning as a vernal pool, and determine its regulatory status, we conducted two additional site visits on April 28, 2014 and May 12, 2014. The purpose of the follow up visits was to conduct a survey of the PVP identified during the initial site visit. Vernal pools are considered "significant" base on the presence of state listed rare, threatened, or endangered species and breeding amphibian (Wood frogs and salamanders). On our first visit, upon approaching the PVP, wood frogs were heard chorusing from the pool. The pool was searched for frog and salamander egg masses, however none were found. The PVP appeared to provide suitable habitat for vernal pool species including attachment points for egg masses (grasses, shrubs and deadfall), water depths to 2 feet deep, relatively open canopy, and mature forested upland surrounding the pool.

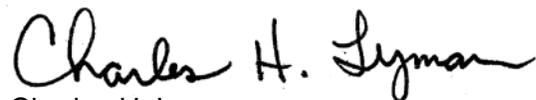
We conducted a second survey of the PVP on May 12, 2014 the pool was searched again for evidence of amphibian breeding. During our search, small black tadpoles approximately 3/8 inches long by 1/8 inch wide were observed in the northeastern (meadow sweet dominated) end of the PVP. In addition hatched eggs in varying stages of decomposition were also observed. Based on the relatively small number of tadpoles, which all occurred in a 5-foot by 5-foot area of the pool and number decomposing egg masses it is unlikely that there would have been a "significant" number of egg masses (i.e. greater than 40). It is more likely that a few egg masses were missed during the initial survey or they were laid soon after the first visit.

A Maine State Vernal Pool Assessment Form was filled out for the two survey events conducted at this pool and is included in Attachment A. Photographs of the PVP, from both survey events are included in Attachment B. The form or photographs have not been submitted to the Maine Department of Inland Fisheries and Wildlife.

No rare, threatened, or endangered species were observed in the PVP surveyed. Although obligate vernal pool species were observed in the pool, it is unlikely that they occur in numbers that would result in this PVP being regulated as a "significant" vernal pool. This habitat is important and will be avoided, regardless of its regulatory status, and will not be directly impacted by the project. In addition, the proposed development (i.e., access road and tower site) will have minimal impacts on the surrounding upland as it pertains to providing upland habitat for vernal pool species, where they spend a majority of the their lives.

Sincerely,

**AMEC Environment & Infrastructure, Inc.**



Charles H. Lyman  
Senior Project Scientist

cc: file

**ATTACHMENT A**  
**MAINE STATE VERNAL POOL ASSESSMENT FORM**



# Maine State Vernal Pool Assessment Form



**INSTRUCTIONS:** Complete all 3 pages of form as thoroughly as possible. Most fields are required for pool registration.

Observer's Pool ID: PVP-A MDIFW Pool ID: \_\_\_\_\_

### 1. PRIMARY OBSERVER INFORMATION

- a. Observer name: Charles H. Lyman
- b. Contact and credentials previously provided?  No (submit Addendum 1)  Yes

### 2. PROJECT CONTACT INFORMATION

- a. Contact name:  same as observer  other \_\_\_\_\_
- b. Contact and credentials previously provided?  No (submit Addendum 1)  Yes
- c. Project Name: BOOTHBAY - MARINER TOWER

**NOTE:** Clear photographs or digital images of a) the pool and b) the indicators (one example of each species egg mass) are required for nonprofessional observers and encouraged for all observers.

### 3. LANDOWNER CONTACT INFORMATION

- a. Are you the landowner?  Yes  No If no, was landowner permission obtained for survey?  Yes  No
- b. Landowner's contact information (required)  
 Name: \_\_\_\_\_ Phone: \_\_\_\_\_  
 Street Address: \_\_\_\_\_ City: \_\_\_\_\_ State: \_\_\_\_\_ Zip: \_\_\_\_\_
- c.  Large Projects: check if separate project landowner data file submitted

### 4. VERNAL POOL LOCATION INFORMATION

a. Location Township: Boothbay

Brief site directions to the pool (using mapped landmarks):  
\_\_\_\_\_

b. Mapping Requirements: At least 2 of the 3 must be submitted (check those submitted):

- USGS topographic map with pool clearly marked.
- Large scale aerial photograph with pool clearly marked.
- GPS data (complete section below).

#### GPS location of vernal pool

Longitude/Easting: \_\_\_\_\_ Latitude/Northing: \_\_\_\_\_

Check Datum:  NAD27  NAD83 / WGS84 Coordinate system: \_\_\_\_\_

- Check one:  GIS shapefile  
 - send to Jason.Czapiga@maine.gov; observer has reviewed shape accuracy (best)
- The pool perimeter is delineated by multiple GPS points. (excellent)  
 - Include map or spreadsheet with coordinates.
  - The above GPS point is at the center of the pool. (good)
  - The center of the pool is approximately \_\_\_\_\_ m  /ft  in the compass direction of \_\_\_\_\_ degrees from the above GPS point. (acceptable)

5. VERNAL POOL HABITAT INFORMATION

a. Habitat survey date (only if different from indicator survey dates on page 3): \_\_\_\_\_

b. Wetland habitat characterization

■ Choose the best descriptor for the landscape setting:

- Isolated depression
- Floodplain depression
- Pool associated with larger wetland complex
- Other: \_\_\_\_\_

■ Check all wetland types that best apply to this pool:

- Forested swamp
- Shrub swamp
- Peatland (fen or bog)
- Emergent marsh
- Wet meadow
- Lake or Pond Cove
- Abandoned beaver flowage
- Active beaver flowage
- Slow stream
- Floodplain
- Isolated pool
- Other: \_\_\_\_\_

c. Vernal pool status under the Natural Resources Protection Act (NRPA)

i. Pool Origin:  Natural  Natural-Modified  Unnatural  Unknown

If modified, unnatural or unknown, describe any modern or historic human impacts to the pool (required):

\_\_\_\_\_

ii. Pool Hydrology

■ Select the pool's estimated hydroperiod AND provide rationale for opinion.

- Permanent
- Semi-permanent (drying partially in all years and completely in drought years)
- Ephemeral (drying out completely in most years)
- Unknown

Explain:

\_\_\_\_\_

■ Maximum depth at survey:  0-12" (0-1 ft.)  12-36" (1-3 ft.)  36-60" (3-5 ft.)  >60" (>5 ft.)

■ Approximate size of pool (at spring highwater): Width: \_\_\_\_\_ m  ft Length: \_\_\_\_\_ m  ft

■ Predominate substrate in order of increasing hydroperiod:

- Mineral soil (bare, leaf-litter bottom, or upland mosses present)
- Organic matter (peat/muck) shallow or restricted to deepest portion
- Mineral soil (sphagnum moss present)
- Organic matter (peat/muck) deep and widespread

■ Pool vegetation indicators in order of increasing hydroperiod (check all that apply):

- Terrestrial nonvascular spp. (e.g. haircap moss, lycopodium spp.)
- Dry site ferns (e.g. spinulose wood fern, lady fern, bracken fern)
- Moist site ferns (e.g. sensitive fern, cinnamon fern, interrupted fern, New York fern)
- Moist site vasculars (e.g. skunk cabbage, jewelweed, blue flag iris, swamp candle)
- Sphagnum moss (anchored or suspended)
- Wet site ferns (e.g. royal fern, marsh fern)
- Wet site shrubs (e.g. ~~highbush blueberry, maleberry, winterberry, mountain holly~~ *meadow sweet*)
- Wet site graminoids (e.g. blue-joint grass, tussock sedge, cattail, bulrushes)
- Aquatic vascular spp. (e.g. pickerelweed, arrowhead)
- Floating or submerged aquatics (e.g. water lily, water shield, pond weed, bladderwort)
- No vegetation in pool

■ Faunal indicators (check all that apply):

- Fish
- Bullfrog or Green Frog tadpoles
- Other: \_\_\_\_\_

iii. Inlet/Outlet Flow Permanency

Type of inlet or outlet (a seasonal or permanent channel providing water flowing into or out of the pool):

- No inlet or outlet
- Intermittent inlet or outlet
- Permanent inlet or outlet (channel with well-defined banks and permanent flow)
- Other or Unknown (explain): \_\_\_\_\_

# Maine State Vernal Pool Assessment Form

## 6. VERNAL POOL INDICATOR INFORMATION

a. Indicator survey dates: \_\_\_\_\_

### b. Indicator abundance criteria

- Was the entire pool surveyed for egg masses?  Yes  No; what % of pool surveyed? \_\_\_\_\_
- For each indicator species, indicate the exact number of egg masses, confidence level for species determination, and egg mass maturity. Separate cells are provided for separate survey dates.

INDICATOR SPECIES	Egg Masses (or adult Fairy Shrimp)						Tadpoles/Larvae			
	#		Confidence Level <sup>1</sup>		Egg Mass Maturity <sup>2</sup>		Observed		Confidence Level <sup>1</sup>	
Wood Frog	0	0	3	3	0	H				
Spotted Salamander	0	0	3	3	0	0				
Blue-spotted Salamander	0	0	3	3	0	0				
Fairy Shrimp <sup>3</sup>	0	0	3	3						

1-Confidence level: 1 = <60%, 2 = 60-95%, 3 = >95%

2-Egg mass maturity: F= Fresh (<24 hrs), M= Mature (round embryos), A= Advanced (loose matrix, curved embryos), H= Hatched or Hatching

3-Fairy Shrimp: X = present

### c. Rarity criteria

- Note any rare species associated with vernal pools. Observations should be accompanied by photographs (labeled with observer name, pool location, and date).

SPECIES	Method of Verification*			CL**	SPECIES	Method of Verification*			CL**
	P	H	S			P	H	S	
Blanding's Turtle	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		Wood Turtle	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Spotted Turtle	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		Ribbon Snake	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Ringed Boghaunter	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		Other:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

\*Method of verification: P = Photographed, H = Handled, S = Seen

\*\*CL - Confidence level in species determination: 1 = <60%, 2 = 60-95%, 3 = >95%

### d. Optional observer recommendation:

- SVP    Potential SVP    Non Significant VP    Indicator Breeding Area

### e. General vernal pool comments and/or observations of other wildlife:

- Heard wood frogs croaking (2) during 1st visit, no eggs observed.  
 - 2nd visit found hatched eggs & woodfrog tadpoles in 5'x5' area in pool. Unlikely to have been 40+ egg masses; not that many hatched eggs or tadpoles observed.

Send completed form and supporting documentation to: Maine Dept. of Inland Fisheries and Wildlife  
 Attn: Vernal Pools  
 650 State Street, Bangor, ME 04401

**NOTE:** Digital submission (to Jason.Czapiga@maine.gov) of vernal pool field forms and photographs is only acceptable for projects with 3 or fewer assessed pools; larger projects must be mailed as hard copies.

**For MDIFW use only**   Reviewed by MDIFW   Date: \_\_\_\_\_   Initials: \_\_\_\_\_

This pool is:  Significant    Potentially Significant but lacking critical data    Not Significant due to:  does not meet biological criteria.    does not meet MDEP vernal pool criteria.

Comments: \_\_\_\_\_

**ATTACHMENT B  
PHOTOGRAPHS**

# Photographs

**Client:** Mariner Tower

**Project Number:** 3618148350

**Site Name:** Boothbay

**Site Location:** Ocean Point Road  
Boothbay, Maine

**Photographer:**  
Charles Lyman

**Date:**  
April 28, 2014

**Photograph:** 1

**Direction:**  
Northeast

**Description:**  
View from middle of PVP looking at meadow sweet dominated area of pool, note deadfall.



**Photographer:**  
Charles Lyman

**Date:**  
April 28, 2014

**Photograph:** 2

**Direction:**  
Southwest

**Description:**  
View from middle of PVP looking southwest.



## Photographs

**Client:** Mariner Tower

**Project Number:** 3618148350

**Site Name:** Boothbay

**Site Location:** Ocean Point Road  
Boothbay, Maine

**Photographer:**  
Charles Lyman

**Date:**  
May 12, 2014

**Photograph:** 3

**Direction:**  
Northeast

**Description:**  
View of meadow sweet  
dominated end of PVP.



**Photographer:**  
Charles Lyman

**Date:**  
May 12, 2014

**Photograph:** 4

**Direction:**  
NA

**Description:**  
Typical tadpole found in  
meadow sweet  
dominated end of the  
PVP.



## Photographs

**Client:** Mariner Tower

**Project Number:** 3618148350

**Site Name:** Boothbay

**Site Location:** Ocean Point Road  
Boothbay, Maine

**Photographer:**  
Charles Lyman

**Date:**  
May 12, 2014

**Photograph:** 5

**Direction:**  
NA

**Description:**  
Hatched and non-viable  
eggs found in pool.



**Photographer:**  
Charles Lyman

**Date:**  
May 12, 2014

**Photograph:** 6

**Direction:**  
NA

**Description:**  
View of hatched and  
non-viable egg masses  
in PVP.



EXHIBIT 4  
Generator Data Sheets

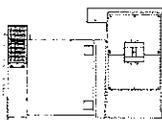
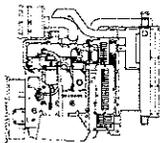
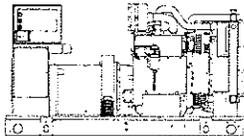
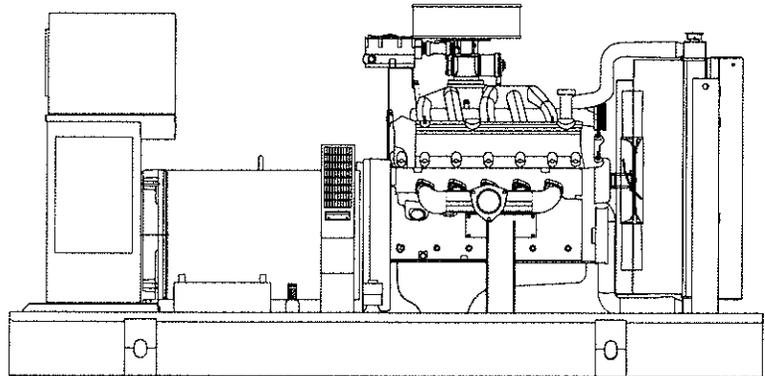
**SG050**

**CUSTOM MODEL**

**Industrial Gaseous Generator Set**

US EPA SI Stationary Emission Regulation 40CFR, Part 60 , Subpart JJJJ

Standby Power Rating  
**50KW 60 Hz**



**features**

**benefits**

Generator Set

- |                                  |                                   |
|----------------------------------|-----------------------------------|
| • PROTOTYPE & TORSIONALLY TESTED | ▶ PROVIDES A PROVEN UNIT          |
| • UL2200 TESTED                  | ▶ ENSURES A QUALITY PRODUCT       |
| • RHINOCOAT PAINT SYSTEM         | ▶ IMPROVES RESISTANCE TO ELEMENTS |
| • SOUND LEVEL 2 ENCLOSURE        | ▶ 71dba @ 7 METERS (23FT)         |

Engine

- |                                       |                                      |
|---------------------------------------|--------------------------------------|
| • EPA CERTIFIED                       | ▶ ENVIRONMENTALLY FRIENDLY           |
| • INDUSTRIAL TESTED, GENERAC APPROVED | ▶ ENSURES INDUSTRIAL STANDARDS       |
| • POWER-MATCHED OUTPUT                | ▶ ENGINEERED FOR PERFORMANCE         |
| • INDUSTRIAL GRADE                    | ▶ IMPROVES LONGEVITY AND RELIABILITY |

Alternator

- |                                   |                                   |
|-----------------------------------|-----------------------------------|
| • TWO-THIRDS PITCH                | ▶ ELIMINATES HARMFUL 3RD HARMONIC |
| • LAYER WOUND ROTOR & STATOR      | ▶ IMPROVES COOLING                |
| • CLASS H MATERIALS               | ▶ HEAT TOLERANT DESIGN            |
| • DIGITAL 3-PHASE VOLTAGE CONTROL | ▶ FAST AND ACCURATE RESPONSE      |

Controls

- |   |                                   |
|---|-----------------------------------|
| • ENCAPSULATED BOARD W/ SEALED HARNESS  | ▶ EASY, AFFORDABLE REPLACEMENT    |
| • 4-20mA VOLTAGE-TO-CURRENT SENSORS     | ▶ NOISE RESISTANT 24/7 MONITORING |
| • SURFACE-MOUNT TECHNOLOGY              | ▶ PROVIDES VIBRATION RESISTANCE   |
| • ADVANCED DIAGNOSTICS & COMMUNICATIONS | ▶ HARDENED RELIABILITY            |

primary codes and standards



**SG050**

**application and engineering data**

**ENGINE SPECIFICATIONS**

**General**

Make	Generac	
EPA Emissions Compliance	Standby Emergency	
EPA Emissions Engine Reference	See Emissions Data Sheet	
Cylinder #	10	
Type	V Type	
Displacement - L	5.6	
Bore - mm (in.)	90.17	3.55
Stroke - mm (in.)	105.3	4.14
Compression Ratio	9.0:1	
Intake Air Method	Naturally Aspirated	

**Cooling System**

Cooling System Type	Pressurized Closed	
Water Pump	Belt Driven	
Fan Type	Pusher	
Fan Speed	1050	
Fan Diameter mm (in.)	560	(22.0)
Coolant Heater Wattage	1500	
Coolant Heater Standard Voltage	120VAC	

**Fuel System**

Fuel Type	LP Vapor	
Carburetor	Down Draft	
Secondary Fuel Regulator	Standard	
Fuel Shut Off Solenoid	Standard	
Operating Fuel Pressure	11"-14" H2O	

**Engine Governing**

Governor	Electronic Isochronous	
Frequency Regulation (Steady State)	+/- 0.25%	

**Engine Electrical System**

System Voltage	12VDC	
Battery Charging Alternator (Amps)	30	
Battery Size	Optima Redtop	
Battery Group	34	
Battery Voltage	12VDC	
Battery Polarity	Negative	

**Lubrication System**

Oil Pump Type	Gear	
Oil Filter Type	Full-Flow	
Crankcase Capacity - L (qts)	6.2	6.00

**ALTERNATOR SPECIFICATIONS**

Standard Model	390	
Poles	4	
Field Type	Revolving	
Insulation Class - Rotor	H	
Insulation Class - Stator	H	
Total Harmonic Distortion	< 3.5%	
Telephone Interference Factor (TIF)	< 50	
Standard Excitation	PMG	
Bearings	Single Sealed Cartridge	
Coupling	Direct, Flexible Disc	
Load Capacity - Standby	100%	
Load Capacity - Prime	100%	
Prototype Short Circuit Test	Y	

Voltage Regulator Type	Digital	
Number of Sensed Phases	All	
Regulation Accuracy (Steady State)	+/- 0.25%	

**CODES AND STANDARDS COMPLIANCE (WHERE APPLICABLE)**

- NFPA 99
- NFPA 110
- ISO 8528-5
- ISO 1708A.5
- ISO 3046
- BS5514
- SAE J1349
- DIN6271
- IEEE C62.41 TESTING
- NEMA ICS 1

**Rating Definitions:**

Standby – Applicable for a varying emergency load for the duration of a utility power outage with no overload capability. (Max. load factor = 70%)

Prime – Applicable for supplying power to a varying load in lieu of utility for an unlimited amount of running time. (Max. load factor = 80%) A 10% overload capacity is available for 1 out of every 12 hours.

# SG050

## operating data (60Hz)

### POWER RATINGS (kW)

Single-Phase 120/240VAC @1.0pf  
~~Three-Phase 120/208VAC @0.8pf~~  
 Three-Phase 120/240VAC @0.8pf  
~~Three-Phase 277/480VAC @0.8pf~~  
 Three-Phase 346/600VAC @0.8pf

STANDBY	
50	Amps: 208
-	Amps: -
-	Amps: -
-	Amps: -

NOTE: Output limited to 48kW, 200A

### STARTING CAPABILITIES (sKVA)

		sKVA vs. Voltage Dip											
		480VAC						208/240VAC					
Alternator*	kW	10%	15%	20%	25%	30%	35%	10%	15%	20%	25%	30%	35%
Standard	50	-	-	-	-	-	-	26	39	52	65	77	90
Upsize 1		-	-	-	-	-	-	-	-	-	-	-	-
Upsize 2		-	-	-	-	-	-	-	-	-	-	-	-

\*All Generac industrial alternators utilize Class H insulation materials. Standard alternator provides less than or equal to Class B temperature rise. Upsize 1 provides less than or equal to Class B temperature rise. Upsize 2 provides less than or equal

### FUEL

#### Fuel Consumption Rates

Propane*	
Percent Load	cu ft/hr
25%	71
50%	135
75%	188
100%	260

### COOLING

Coolant System Capacity - Gal (L)  
 6.3 (24.41)

Maximum Radiator Backpressure  
 0.5" H<sub>2</sub>O Column

STANDBY		
Coolant Flow per Minute	gpm (lpm)	39 (148)
Heat rejection to Coolant	BTU/min	182,000
Inlet Air	cfm (m3/min)	5,600 (159)
Max. Operating Radiator Air Temp	F° (C°)	160 (60)
Max. Operating Ambient Temperature	F° (C°)	122 (50)

### COMBUSTION AIR REQUIREMENTS

Intake Flow at Rated Power  
 cfm (m3/min) 160 (4.53)

### EXHAUST

Exhaust Outlet Size (Open Set)  
 2.5" i.d. Flex

Maximum Backpressure (Post-Silencer)  
 1.5" Hg

STANDBY		
Exhaust Flow (Rated Output)	cfm (m3/hr)	455 (12.9)
Maximum Backpressure	inHg (kpa)	1.5 (5.3)
Exhaust Temp (Rated Output)	F° (C°)	1000 (537)

### ENGINE

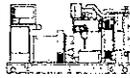
STANDBY		
Rated Engine Speed	rpm	1800
Horsepower at Rated kW**	hp	80
Temperature Deration		Consult Factory
Altitude Deration		Consult Factory

Deration - Operational characteristics consider maximum ambient conditions. Derate factors may apply under atypical site conditions. Please consult a Generac Power Systems Industrial Dealer for additional details. All performance ratings in accordance with ISO3046, BS5514, ISO8528 and DIN6271 standards.

**SG050**

**standard features and options**

**GENERATOR SET**



- Genset Vibration Isolation Std
- Factory Testing Std
- Extended warranty Std
- Padlockable Doors Std
- Steel Enclosure (Enclosed Models) Std
- Remote Emergency Shutdown Opt

**ENGINE SYSTEM**



**General**

- Oil Drain Extension Std
- Air Cleaner Std
- Industrial Exhaust Silencer (Open Sets, ship loose) Std
- Critical Exhaust Silencer (Enclosed Sets) Std
- Stainless steel flexible exhaust connection Std

**Fuel System**

- Electronic Fuel Stop Solenoid Std
- Secondary Fuel Regulator Std
- Flexible Fuel Lines Std

**Cooling System**

- 120VAC Coolant Heater (3-wire connection cord) Std
- 50%/50% Coolant Std
- Level 1 Guarding (Open Sets) Std
- Closed Coolant Recovery System Std
- UV/Ozone resistant hoses Std
- Factory-Installed Radiator Std
- Radiator Drain Extension Std
- Fan guard Std
- Radiator duct adapter (Open Sets) Std

**Engine Electrical System**

- Battery charging alternator Std
- Battery cables Std
- Battery tray Std
- 75W 120VAC Battery heater Std
- Solenoid activated starter motor Std
- 10A UL float/equalize battery charger Std
- Weather Resistant electrical connections Std
- Duplex GFCI Convenience Outlet Std

**ALTERNATOR SYSTEM**



- UL2200 GENprotect™ Std
- 100% Rated 200A Main Line Circuit Breaker Std

**CONTROL SYSTEM**



**Control Panel**

- Digital H Control Panel - Dual 4x20 Display Std
- Programmable Crank Limiter Std
- 7-Day Programmable Exerciser (requires H-Transfer Switch) Std
- Special Applications Programmable PLC Std
- RS-232 Std
- RS-485 Std
- All-Phase Sensing DVR Std
- Full System Status Std
- Utility Monitoring (Req. H-Transfer Switch) Std
- 2-Wire Start Compatible Std
- Power Output (kW) Std
- Power Factor Std
- Reactive Power Std
- All phase AC Voltage Std
- All phase Currents Std
- Oil Pressure Std
- Coolant Temperature Std
- Coolant Level Std
- Low Fuel Pressure Indication Std
- Engine Speed Std
- Battery Voltage Std
- Frequency Std
- Date/Time Fault History (Event Log) Std
- UL2200 GENprotect™ Std
- Low-Speed Exercise Opt
- Isochronous Governor Control Std
- 40deg C - 70deg C Operation Std
- Weather Resistant Electrical Connections Std
- Audible Alarms and Shutdowns Std
- Not in Auto (Flashing Light) Std
- On/Off/Manual Switch Std
- E-Stop (Red Mushroom-Type) Std
- Remote E-Stop (Break Glass-Type, Surface Mount) -
- Remote E-Stop (Red Mushroom-Type, Surface Mount) -
- Remote E-Stop (Red Mushroom-Type, Flush Mount) -
- NFPA 110 Level I and II (Programmable) Std
- Remote Communication - RS232 Std

**Alarms (Programmable Tolerances, Pre-Alarms and Shutdowns)**

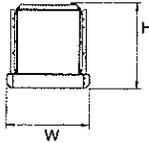
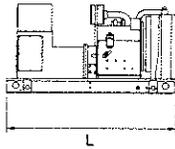
- Fuel Pressure Std
- Oil Pressure (Pre-programmed Low Pressure Shutdown) Std
- Coolant Temperature (Pre-programmed High Temp Shutdo) Std
- Coolant Level (Pre-programmed Low Level Shutdown) Std
- Engine Speed (Pre-programmed Overspeed Shutdown) Std
- Voltage (Pre-programmed Overvoltage Shutdown) Std
- Battery Voltage Std

**Other Options**

- Single Side Service
- 
-

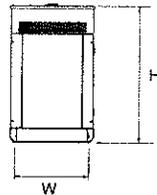
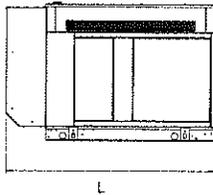
**SG050**

**dimensions, weights and sound levels**



**OPEN SET**

	L	W	H	WT	dBA*
○	92.9	40	61	2030	54



**LEVEL 2 SOUND ENCLOSURE**

	L	W	H	WT	dBA*
○	111.8	40.5	67.7	2865	74

\*Weights consider steel enclosure. Sound levels measured at 23ft (7m) and does not account for ambient site conditions.

YOUR FACTORY RECOGNIZED GENERAC INDUSTRIAL DEALER

Specification characteristics may change without notice. Dimensions and weights are for preliminary purposes only. Please consult a Generac Power Systems Industrial Dealer for detailed installation drawings.

EXHIBIT 5  
Equipment Shelter Data Sheets

**CODE SUMMARY**

2000 INTERNATIONAL BUILDING CODE  
 2000 STANDARD BUILDING CODE  
 2003 INTERNATIONAL BUILDING CODE  
 2006 INTERNATIONAL BUILDING CODE  
 2009 INTERNATIONAL BUILDING CODE  
 2012 INTERNATIONAL BUILDING CODE  
 1994 UNIFORM MECHANICAL CODE  
 1996 BOCA MECHANICAL CODE  
 1997 STANDARD MECHANICAL CODE  
 1997 UNIFORM MECHANICAL CODE  
 2000 INTERNATIONAL MECHANICAL CODE  
 2000 STANDARD MECHANICAL CODE  
 2003 INTERNATIONAL MECHANICAL CODE  
 2006 INTERNATIONAL MECHANICAL CODE  
 2009 INTERNATIONAL MECHANICAL CODE  
 2012 INTERNATIONAL MECHANICAL CODE  
 2000 MINNESOTA STATE ENERGY CODE (CH. 1323)  
 2004 CHICAGO BUILDING CODE  
 2007 KENTUCKY BUILDING CODE  
 2007 MINNESOTA STATE MECHANICAL CODE (CH. 1346-2000 IMC & 2000 IFGC W/ AMEND.)  
 2007 MINNESOTA STATE BUILDING CODE  
 2009 NEW MEXICO COMMERCIAL BUILDING CODE  
 2011 NEW MEXICO ELECTRICAL CODE  
 2009 NEW MEXICO MECHANICAL CODE  
 2009 MICHIGAN BUILDING CODE  
 2009 MICHIGAN MECHANICAL CODE  
 2010 CALIFORNIA BUILDING CODE  
 2010 CALIFORNIA GREEN BUILDING STANDARDS  
 2010 CALIFORNIA ENERGY CODE  
 2010 NEW YORK CITY BUILDING CODE  
 2010 NEW YORK STATE BUILDING CODE  
 2010 NEW YORK STATE ELECTRICAL CODE  
 2010 NEW YORK STATE MECHANICAL CODE  
 2010 NEW YORK STATE ENERGY CONSERVATION CONSTRUCTION CODE  
 2010 NEW YORK STATE FIRE CODE  
 NORTH DAKOTA ELECTRICAL WIRING STANDARDS  
 2010 FLORIDA BUILDING CODE WITH 2012 AMENDMENTS  
 2010 FLORIDA BUILDING CODE MECHANICAL  
 2010 FLORIDA BUILDING CODE FUEL GAS  
 2011 MASSACHUSETTS ELECTRICAL CODE  
 8TH MASSACHUSETTS STATE BUILDING CODE  
 2011 OHIO BUILDING CODE  
 2011 OHIO MECHANICAL CODE  
 2011 OHIO FIRE CODE  
 CALIFORNIA TITLE 25  
 2010 OREGON STRUCTURAL SPECIALITY CODE  
 2010 OREGON MECHANICAL SPECIALITY CODE  
 2010 OREGON ENERGY EFFICIENCY SPECIALITY CODE  
 2012 NORTH CAROLINA BUILDING CODE  
 2011 NORTH CAROLINA ELECTRICAL CODE  
 2012 NORTH CAROLINA MECHANICAL CODE  
 2012 NORTH CAROLINA ENERGY CONSERVATION CODE  
 2012 TEXAS ACCESSIBILITY STANDARDS  
 1996-2011 NATIONAL ELECTRICAL CODE  
 1989,1999,2001,2004,2007 ASHRAE 90.1  
 2000,2003,2006,2009, 2012 INTERNATIONAL ENERGY CONSERVATION CODE  
 2000,2003,2005,2006,2009,2012 NFPA 101 LIFE SAFETY CODE  
 2003 NFPA 1 UNIFORM FIRE CODE  
 2002 ARKANSAS FIRE PREVENTION CODE  
 2009 NORTH CAROLINA FIRE PREVENTION CODE  
 RHODE ISLAND FIRE SAFETY CODE

**NOTES**

- LISTED CODES INCLUDE LATEST STATE ADOPTED AMENDMENTS.
- THIS SHELTER IS AN "ENCLOSED STRUCTURE" NOT INTENDED FOR HUMAN HABITATION.
- APPROVED MODEL MAY BE MIRROR IMAGE.
- OCCUPANT LOAD = 0, OHIO = 2
- SPECIAL CONDITIONS AND PERMISSIBLE TYPES OF GASES: N/A
- SHELTER HAS NO COUNTY PLACEMENT RESTRICTION IN THE STATE OF MARYLAND.
- STATE INSIGNIA LABEL/DECAL IS LOCATED NEAR MAIN ELECTRICAL SERVICE PANEL.
- DOOR MUST BE MINIMUM 90 MINUTE FIRE RATED IF USED IN 2 HOUR FIRE RATED SHELTER AND MINIMUM 45 MINUTE FIRE RATED IF USED IN 1 HOUR FIRE RATED SHELTER.
- NOT SUBJECT TO FLORIDA FIRE SAFETY CODE, COMPLIANCE IS THE RESPONSIBILITY OF THE LOCAL JURISDICTION CODE OFFICIAL.
- ACCESS TO SHELTER SHALL COMPLY WITH MARYLAND ACCESSIBILITY CODE COMAR .05.02.02.07/ADAAG SECTION 4.1.2.
- APPLICABLE INTERNAL PRESSURE COEFFICIENT (N/A) - THESE SHELTERS CONFORM TO THE REQUIREMENTS OF (2000,03,06,09 IBC), ASCE 7-05, METHOD 1 SIMPLIFIED PROCEDURE; (2012 IBC, 2010 FBC) ASCE 7-10 SIMPLIFIED DIAPHRAM LOW-RISE BUILDINGS.
- WIND IMPORTANCE FACTOR - IW = 1.000
- THESE PLANS ARE DESIGNED TO BE USED FOR THE CONSTRUCTION OF COMMERCIAL MODULAR UNITS, IN ACCORDANCE WITH CA HEALTH AND SAFETY CODE SECTION 18028, 1991 UBC, 1993 NEC, ANSI A117.1-1986.
- THE 2005 NEC IS MORE STRINGENT THAN THE 2002 NEC, 2008 NEC.
- HVAC UNITS ARE SIZED PER CUSTOMER REQUIREMENTS.
- EXTERNAL GROUNDING BY OTHERS.
- SHELTER CONSTRUCTED IN ACCORDANCE WITH 61G20-3.006.
- THIS BUILDING DOES NOT CONTAIN PLUMBING FACILITIES.

ZONE	EXTERIOR COMPONENTS AND CLADDING POSITIVE AND NEGATIVE PRESSURES IN TERMS OF PSF			
	2000 IBC, 120 MPH WIND SPEED	2003 IBC, 2006 IBC, 120 MPH WIND SPEED	2000,2003,2006,2009,2012 IBC, 150 MPH WIND SPEED	2010 FBC, 180 MPH WIND SPEED
ROOF ZONE 1 (100 SF EFFECTIVE WIND AREA)	+12.1/-28.7	+10.0/-28.7	+15.7/-44.8	+22.7/-64.5
ROOF ZONE 2 (20 SF EFFECTIVE WIND AREA)	+12.1/-46.9	+12.0/-46.9	+18.6/-73.4	+26.9/-105.8
ROOF ZONE 3 (10 SF EFFECTIVE WIND AREA)	+12.7/-79.1	+12.7/-79.1	+20.0/-123.7	+28.7/-178.1
WALL ZONE 4 (200 SF EFFECTIVE WIND AREA)	+25.8/-28.4	+25.8/-28.4	+39.6/-43.4	+58.2/-64.1
WALL ZONE 5 (30 SF EFFECTIVE WIND AREA)	+29.3/-38.0	+29.3/-38.0	+45.9/-59.2	+65.9/-92.3

**INDEX OF SHEETS**

**LAYOUT DRAWINGS**

- 0-0 COVER SHEET
- 0-1 PARTS LIST
- 0-2 PARTS LIST CONTINUED
- 0-3 PARTS LIST CONTINUED/CUT LIST/SHOP DETAILS
- 0-4 OPTIONAL COMPONENTS
- 1-0 EXTERIOR ELEVATIONS "A" & "C"
- \*1-1 EXTERIOR ELEVATION "B"
- \*1-2 EXTERIOR ELEVATION "D"
- 2-0 FLOOR PLAN (OPTION "J1")
- 2-1 FLOOR PLAN (OPTION "J2")
- 2-2 EQUIPMENT LAYOUT
- 2-3 REFLECTED CEILING PLAN (OVERLAY)
- 3-0 REFLECTED CEILING PLAN (ELECTRICAL)
- 3-1 REFLECTED CEILING PLAN (MECHANICAL)
- 4-0 INTERIOR ELEVATIONS "A" & "C" (ELECTRICAL)
- 4-1 INTERIOR ELEVATION "B" (ELECTRICAL)
- 4-2 INTERIOR ELEVATION "D" (ELECTRICAL)
- 5-0 INTERIOR ELEVATIONS "A" & "C" (MECHANICAL)
- 5-1 INTERIOR ELEVATION "B" (MECHANICAL)
- 5-2 INTERIOR ELEVATION "D" (MECHANICAL)
- 5-3 INTERIOR GROUND BAR DETAILS
- 5-4 TELCO/EXTERIOR GROUND BAR DETAIL
- \*6-0 ELECTRICAL SCHEMATIC
- 6-1 LOW VOLTAGE WIRING SCHEMATIC
- 6-2 COMMSTAT 4 / SMOKE WIRING
- 6-3 LOW VOLTAGE WIRING GEN. INTERFACE
- 6-4 MC-4000A / SMOKE WIRING
- 7-0 DETAIL DRAWING

\* = DENOTES SHEETS WHICH MAY CONTAIN FIELDWORK

**REFERENCE DRAWINGS**

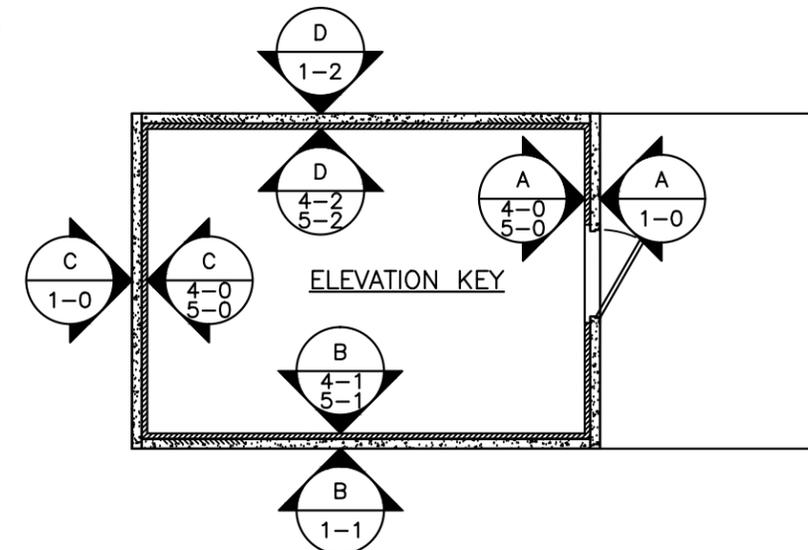
- 108-001-01 6" SLAB FOUNDATION PLAN (FLAT TIE DOWN)
- 108-007 ABBREVIATIONS AND SYMBOLS
- 108-008 CONCRETE SHELTER PANEL CONNECTION DETAILS
- 108-015 GENERAL ELECTRICAL NOTES & LEGEND
- 108-016 GENERAL CASTING SPECIFICATIONS
- 108-035 CONCRETE SHELTER INTERIOR INSULATION/PANEL INSTALL. DETAILS
- 108-088 SHELTER LIFTING DETAILS
- 108-089 SHELTER LOADING DETAILS
- 108-136 AT&T (ATN ONLY) STD ALARM BLOCK TERMINATIONS

**STRUCTURAL DRAWINGS (MANUFACTURE ONLY)**

- S1 OF 8 STRUCTURAL SPECIFICATIONS
  - S2 OF 8 STRUCTURAL LAYOUT - END WALL "A"
  - S3 OF 8 MESH LAYOUT - END WALL "A"
  - S4 OF 8 STRUCTURAL LAYOUT - SIDE WALL "B"
  - S5 OF 8 STRUCTURAL LAYOUT - SIDE WALL "B"
  - S6 OF 8 MESH LAYOUT - END WALL "C"
  - S7 OF 8 STRUCTURAL LAYOUT - SIDE WALL "D"
  - S8 OF 8 STRUCTURAL LAYOUT - ROOF
- 221-1105X2400-08 CONCRETE FLOOR ASSY KIT,11'5"x20'0" (OPTION "H1")  
 221-1105X2400-09 CONCRETE FLOOR ASSY KIT,11'5"x20'0" (OPTION "H2")

**DESIGN PARAMETERS**

USE GROUP: B (BOCA, MASBC)  
 S-2 (FBC, IBC, SBC, UBC)  
 U (OBC)  
 CONSTRUCTION TYPE: 5B (BOCA, MASBC)  
 IV-UNP (SBC)  
 V-B (IBC, FBC)  
 V-N (UBC)  
 ROOF LIVE LOAD: 94 PSF  
 FLOOR LIVE LOAD: 250 PSF  
 GROUND SNOW LOAD: 111 PSF (N/A FOR FBC 2007)  
 WIND SPEED: 180 MPH/EXPOSURE C  
 SEISMIC ZONE FOR SBC & UBC: 4  
 SEISMIC DESIGN CATEGORY FOR IBC: E (IBC)  
 USE GROUP-III (OBC)  
 SITE CLASS-D (OBC)  
 CONCRETE f'c: 5000 PSI AT 28 DAYS  
 CONCRETE UNIT WEIGHT: 115 PCF  
 FIRE RATING: 2 HOUR WALL AND ROOF PER IBC/FBC TABLE 720.1 (2),  
 ITEM NUMBER 4-1.1, SOLID LIGHTWEIGHT CONCRETE  
 (LIMITATIONS MAY APPLY DUE TO OPENINGS AND PROXIMITY ON SITE)  
**PHYSICAL PROPERTIES**  
 SHELTER DIMENSIONS: 11'-5"W X 16'-0"L  
 SHIPPING DIMENSIONS: 11'-11"W X 25'-10 7/8"L X 10'-4 1/2"H  
 SHELTER WEIGHT: 56,750 LBS  
 (EXCLUDES BATTERIES AND RADIO EQUIPMENT)



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CUSTOMER:  
**AT&T WIRELESS SERVICES**

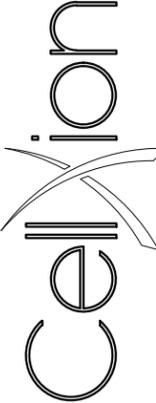
PROJECT:  
**11'-5" X 16'-0" CONCRETE SHELTER COVER SHEET**

FILENAME: SATN22	
SCALE: N.T.S.	TOLERANCE:
DRWN. BY: J. REEVES	DATE: 7/25/13
CHK. BY: D. BROYLES	DATE: 7/25/13
ENG. BY:	DATE:
APP. BY: D. BRANNEN	DATE: 7/25/13
SHEET NO. 0-0	
DRAWING NO.:	REV.:
SATN22	

PARTS LIST						
ITEM	QTY	U/M	P/N	DEPT	DESCRIPTION	MFG MFG P/N
1	1.0000	EA.	350025	20	TELCO BOARD,4'X8'OSB,WITH 3/8"FRP (OR EQUAL)	CELLXION 350025
2	3.0000	EA.	168283	30	BUSHING,PLASTIC,1/2",SNAP-IN,HEYCO (OR EQUAL)	HEYCO SB875-11
3	6.0000	EA.	170037	30	PIPE,GALV,SCH 40,1",CAP (OR EQUAL)	FASTENAL 66690
4	3.0000	EA.	400367	30	LUG,2H,#4-1/0,MECH,W/SET SCREW,L125 (OR EQUAL)	BLACKBURN L125-2
5	1.0000	EA.	410009	30	CONDULET,BODY AL LB,2",LB200D	
6	2.0000	EA.	410014	30	CONDULET,BODY AL LB,3/4",LB75D	
7	1.0000	EA.	410100	30	NIPPLE,EMT,3/4",CHASE	
8	2.0000	EA.	410113	30	NIPPLE,EMT,1/2",OFFSET (OR EQUAL)	STEEL CITY H0221
9	1.0000	EA.	410140	30	NIPPLE,RIGID,2",CLOSE	
10	3.0000	EA.	410181	30	NIPPLE, RIGID, 2" X 8 1/2"	
11	7.0000	EA.	410206	30	NIPPLE,RIGID,3/4"X8"	
12	2.0000	EA.	410207	30	NIPPLE,RIGID,1/2"X8"	
13	7.0000	EA.	410217	30	NIPPLE,RIGID,1"X8"	
14	1.0000	EA.	410280	30	NIPPLE,RIGID,1/2"X5 1/2"	
15	4.0000	EA.	430003	30	BOX,JUNCT,4 OCT X1 1/2,3/4&1/2KO (OR EQUAL)	STEEL CITY 541511234
16	15.0000	EA.	430005	30	BOX,JUNCT,4"X4",2-1/8D,1/2"-3/4KO (OR EQUAL)	STEEL CITY 521711234E
17	3.0000	EA.	430008	30	BOX,6X6X4,SCREW COVER,NEMA 1,0-KO (OR EQUAL)	HOFFMAN ASE6X6X4NK
18	4.0000	EA.	430029	30	BOX,JUNCT,4-11/16"X4-11/16"D-2 1/8" (OR EQUAL)	STEEL CITY 721711234
19	2.0000	EA.	430030	30	BOX,JUNCT,2X4,WP,(3) 1/2"HOLES (OR EQUAL)	LEGRAND WPB23
20	1.0000	EA.	430048	30	WIREWAY,GALV,4"X4"X60",W/O KO'S (OR EQUAL)	HOFFMAN F-44T160GV
21	2.0000	EA.	430049	30	WIREWAY,GALV,4"X4",CLOSURE PLATE,NO (OR EQUAL)	HOFFMAN F-44GCPNKGV
22	4.0000	EA.	430050	30	WIREWAY,GALV,4"X4",U-CONNECTOR (OR EQUAL)	HOFFMAN F-44GUCGV
23	2.0000	EA.	430054	30	BOX,JUNCT,2"X4",1 7/8" DEEP	
24	1.0000	EA.	430061	30	WIREWAY,GALV,4X4,90D ELBOW (OR EQUAL)	HOFFMAN F-4490EGV
25	1.0000	EA.	430252	30	WIREWAY,GALV,4"X4"X18",W/O KO'S (OR EQUAL)	HOFFMAN F-44T118GV
26	1.0000	EA.	430268	30	WIREWAY,GALV,4"X4"X48",W/O KO'S (OR EQUAL)	HOFFMAN F-44T148GV
27	1.0000	EA.	430324	30	BOX,ENCLOSURE,12"X12X6",N3R,PVC	CARLON E989R-UPC
28	1.0000	EA.	430548	30	PANEL,CMBIN,INT,200A,42S,ATS,TVSS,3	INTERSECT AA1220061-3S
29	1.0000	EA.	430614	30	BOX,JUNCT,4X4,WEATHERPROOF,1"KO (OR EQUAL)	TEDDICO/BWF TGB-100V
30	1.0000	EA.	430644	30	PLUG,4",RED PLASTIC	
31	1.0000	EA.	430713	30	PANEL,MICRIN INTERFACE,200A,1P	MICRIN MTC6001EC-2-1
32	1.0000	EA.	431360	30	BOX,JUNCT,MULTI,4-1/2 x 6-13/16 x 1-5/8 (OR EQUAL)	RACO 951
33	1.0000	EA.	431419	30	BOX,JUNCT,4-11/16"W/3/4" & 1" K/O'S (OR EQUAL)	STEEL CITY
34	1.0000	EA.	431427	30	ALARM BLOCK,SIEMON,S66B3-100MH-49 (OR EQUAL)	SIEMON S66B3-100MH-49
35	1.0000	EA.	460002	30	THERMOSTAT,HI/LOW TEMP,TH-4-20 (OR EQUAL)	EVENTHERM TH-4-20
36	2.0000	EA.	470615	30	LIGHT FIXTURE,32W,2 BULB,4FT,WR,T-8	TEXAS FLUORESCENTS 207A232-MVC-D
37	6.0000	EA.	510142	30	UNISTRUT,1 5/8"CHANNEL,GOLDGALV,9"	
38	1.0000	EA.	168186	40	WASHER,1/2" FLAT,STAINLESS (OR EQUAL)	FASTENAL 78021
39	5.0000	EA.	400272	40	BREAKER,SQD,1P 20A,BOLT ON,QOB120	
40	12.0000	EA.	400284	40	BREAKER,SQD,2P 40A,BOLT ON,QOB240	
41	1.0000	EA.	400295	40	BREAKER,SQD,2P 20A,BOLT ON,QOB220	
42	2.0000	EA.	400297	40	BREAKER,SQD,2P 50A,BOLT ON,QOB250	
43	1.0000	EA.	410002	40	CONDULET,BODY COVER,2" ALUM	
44	2.0000	EA.	410005	40	CONDULET,BODY COVER,3/4" AL,CC75	
45	2.0000	EA.	410040	40	CONDULET,GASKET 3/4",GASK025N	
46	1.0000	EA.	410043	40	CONDULET,GASKET 2",GASK065N	
47	32.0000	FT.	410119	40	CONDUIT,LFMC,1",SEALTITE (OR EQUAL)	ANAMET ELECTRICAL, INC EF1
48	8.0000	EA.	410155	40	CONNECTOR,LFMC,1",45D,SEALTITE (OR EQUAL)	T&B 5244
49	1.0000	EA.	420006	40	LABEL,BLK,ELECT,"GFCI"	
50	1.0000	EA.	420007	40	LABEL,BLK,ELECT,"ALARM BLOCK"	
51	1.0000	EA.	420009	40	LABEL,BLK,ELECT,"INTERIOR LIGHT"	
52	1.0000	EA.	420010	40	LABEL,BLK,ELECT,"AC PANEL"	
53	1.0000	EA.	420015	40	LABEL,BLK,ELECT,"HIGH TEMP"	
54	1.0000	EA.	420016	40	LABEL,BLK,ELECT,"LEAD-LAG CONTROLL"	
55	1.0000	EA.	420017	40	LABEL,BLK,ELECT,"HVAC #2"	
56	1.0000	EA.	420018	40	LABEL,BLK,ELECT,"HVAC #1"	
57	1.0000	EA.	420024	40	LABEL,BLK,ELECT,"EXTERIOR LIGHT"	
58	16.0000	EA.	420033	40	LABEL, SELF TRANSFER, PANDUIT TTSL2	
59	1.0000	EA.	420034	40	LABEL,BLK,ELECT,"DC LIGHT"	
60	1.0000	EA.	420037	40	LABEL,BLK,ELECT,"TVSS"	
61	1.0000	EA.	420041	40	LABEL,"ARC FLASH AND SHOCK WARNING"	
62	1.0000	EA.	430006	40	COVER,SWITCH PLATE,4X4,1 SWITCH	
63	7.0000	EA.	430012	40	COVER,BLANK PLATE,4X4 (OR EQUAL)	APPLETON 8465
64	5.0000	EA.	430014	40	COVER,BLANK PLATE,4 11/16 (OR EQUAL)	APPLETON 8487
65	5.0000	EA.	430025	40	COVER,RECPT PLATE,4X4,2R (OR EQUAL)	APPLETON 8365N

DEPT CODES:  
30 - CONDUIT  
40 - ELECTRICAL  
50 - MECHANICAL  
51 - DOORS  
55 - HVAC  
70 - TILE/FLOORING  
75 - GENERATOR  
95 - MULTI-TASK  
99 - PACKING LIST  
150 - INSTALLATION DEPT

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CUSTOMER:  
**AT&T WIRELESS SERVICES**

PROJECT:  
**11'-5" X 16'-0" CONCRETE SHELTER PARTS LIST**

FILENAME: SATN22	
SCALE: N.T.S.	TOLERANCE:
DRWN. BY: J. REEVES	DATE: 7/25/13
CHK. BY: D. BROYLES	DATE: 7/25/13
ENG. BY:	DATE:
APP. BY: D. BRANNEN	DATE: 7/25/13
SHEET NO. 0-1	
DRAWING NO.: SATN22	REV.:

PARTS LIST CONTINUED

ITEM	QTY	U/M	P/N	DEPT	DESCRIPTION	MFG	MFG P/N
66	2.0000	EA.	430033	40	RECEPTACLE,GFCI,120V,20A,NEMA5,WR (OR EQUAL)	HUBBELL	GFTR20I
67	5.0000	EA.	430034	40	RECEPTACLE,DUPLX,125V,20A,IVORY (OR EQUAL)	COOPER	CR20V
68	1.0000	EA.	430367	40	COVER,BLANK PLATE,4X4 WP (OR EQUAL)	BELL	5175-0
69	2.0000	EA.	430384	40	COVER,GFCI,2 REC,HORZ,WTS15A-C (OR EQUAL)	STEEL CITY	STSG15A-C
70	1.0000	EA.	430437	40	SWITCH,SPST,125VAC,24VDC,TOGGLE (OR EQUAL)	SELECTA	SS209-8-BG
71	1.0000	EA.	430847	40	CONNECTOR,MICRIN ALARM CONTACT CBL	MICRIN	MC2075
72	2.0000	EA.	470047	40	LIGHT FIXTURE,LENS,2-BULB T-8		
73	1.0000	EA.	470056	40	LIGHT FIXTURE,COMBO EXIT/EMERGENCY (OR EQUAL)	EXITRONIX	VEX-U-BP-WH-EL-90
74	4.0000	EA.	470058	40	LIGHT BULB,F32 T-8 MED BIPIN		
75	3.0000	EA.	470083	40	LIGHT FIXTURE,60W/250V,PORCELAIN (OR EQUAL)	LEVITON	49875-2
76	3.0000	EA.	470085	40	LIGHT,STEEL GUARD FOR INCANDESCENT (OR EQUAL)	MCMMASTER-CARR	1591K11
77	1.0000	EA.	470425	40	TIMER,6HR,SPR WOUND,DPST,FF46H		
78	1.0000	EA.	470426	40	TIMER,6HR,SPR WOUND,SPST,FF6H		
79	3.0000	EA.	470428	40	LIGHT BULB,50W INCANDESCENT,48V		
80	1.0000	EA.	470736	40	LIGHT,EXTER,LED MOTION, TWIN HEAD		
81	1.0000	EA.	490000	40	ALARM,MAGNETIC DOOR CONTACT (OR EQUAL)	ADEMCO	7939
82	1.0000	EA.	490049	40	DETECTOR,HUMIDITY,HA-1,WINLAND (OR EQUAL)	WINLAND ELECTRONICS, INC.	HA-1 (PN#1190)
83	1.0000	EA.	490067	40	DETECTOR,SMOKE,48V,PHOTO,SENTROL (OR EQUAL)	SENTROL	449CSRT
84	1.0000	EA.	490098	40	DETECTOR,H2,24-60VDC,1%N/0.2%N/C (OR EQUAL)	ARRGH MANUFACTURING	HGDI-DR-DC
85	1.0000	EA.	900106	40	CONNECTOR,MICRIN ALARM CONTACT SHRT	MICRIN	MC2076
86	3.0000	EA.	400001	50	LUG,2H,#6,BLU,3/8"BOLT,1"C/C,LBFW		
87	3.0000	EA.	400020	50	LUG,1H,#6,BLU,1/4" BOLT,LBFW		
88	9.0000	EA.	400021	50	C-TAP,BROWN,54720 (OR EQUAL)	PANDUIT	CTAPF4-12-C
89	42.0000	FT.	400030	50	WIRE,#6 THHN, STRAND, GRN		
90	79.0000	FT.	400050	50	WIRE,#2 THHN,STRAND,GRN		
91	19.0000	EA.	400051	50	C-TAP,ORANGE,54740 (OR EQUAL)	PANDUIT	CTAPF1/0-12-L
	108.0000	FT.	400099	50	WIRE,#2 SOLID COPPER,BARE,TINNED		
94	23.0000	EA.	400174	50	C-TAP,PINK,54730 (OR EQUAL)	PANDUIT	CTAPF2-12-C
95	6.0000	EA.	400259	50	LUG,2H,#2,BRN,3/8"BOLT,1"C/C,LBFW (OR EQUAL)	PANDUIT	LCCXF2-38D-L
96	3.0000	EA.	400367	50	LUG,2H,#4-1/0,MECH,W/SET SCREW,L125 (OR EQUAL)	BLACKBURN	L125-2
97	10.0000	EA.	400371	50	LUG,2H,#6,BLU,1/4"BOLT,3/4"C/C,LBFW (OR EQUAL)	PANDUIT	LCCXF6-14B-L
98	2.0000	EA.	400377	50	LUG,2H,#4,GRY,1/4"BOLT,3/4"C/C,LBFW (OR EQUAL)	PANDUIT	LCCXF4-14B-L
99	3.0000	EA.	400390	50	LUG,2H,#2,BRN,1/4"BOLT,3/4"C/C,LBFW (OR EQUAL)	PANDUIT	LCCXF2-14B-L
100	12.0000	EA.	400500	50	CLAMP,GROUND 1/2"-1",GC-1Z (OR EQUAL)	WEAVER	GC-1Z
101	1.0000	EA.	400623	50	CLAMP,GROUND 1 1/2",RB12B,PERPENDIC (OR EQUAL)	WEAVER	RB12B
102	118.0000	EA.	410343	50	WIRE STANDOFF,1 3/4"		
103	20.0000	EA.	410396	50	BUSHING,INSULATING,CEILING BRACKET		
104	3.0000	EA.	440005	50	LINE PROTECTOR,AC DATA #TJ1010 T1	RAYCAP INC	#TJ1010 T1
105	1.0000	EA.	480005	50	SABRE BLUE SERIAL NO.PLAT		
106	1.0000	EA.	480025	50	DESK,FOLD DOWN,20"X15"X2-3/4"		
	4.0000	EA.	510052	50	CABLE LADDER,24"X9'8 1/2",YELLOW ZI (OR EQUAL)	CENTRAL STEEL FABRICATORS, INC.	10024ZY
111	4.0000	EA.	510053	50	CABLE LADDER,24"X9'8 1/2",YELLOW ZI (OR EQUAL)	CENTRAL STEEL FABRICATORS, INC.	ET124
112	20.0000	EA.	510151	50	CABLE LADDER,TRAY HANGER,11"		
113	2.0000	EA.	521002	50	HVAC,GRILL,SUPPLY,10"X30"		
114	2.0000	EA.	521102	50	HVAC,GRILL,RETURN,16"X30"		
115	2.0000	EA.	522001-00006	50	HVAC,SLEEVE,10"X30"X6"		
116	2.0000	EA.	522001-00012	50	HVAC,SLEEVE,16"X30"X6"		
117	1.0000	EA.	530023	50	WAVEGUIDE ENTRY,24 PORT,4",4X6		
118	1.0000	EA.	540091-01	50	G-BAR KIT,GALV,ANTI-THEFT,1/4"X30" (OR EQUAL)	GTI	
119	4.0000	EA.	540218	50	GROUND STRAP ASSY,#6 THHN,14 1/2"		
120	1.0000	EA.	P540179-01	50	G-BAR ASSY,540179-01 KIT & HARDWARE		
121	1.0000	EA.	P540227-05	50	G-BAR ASSY,540227-05 KIT & HARDWARE		
122	3.0000	EA.	504000	51	DOOR,HINGES,STAINLESS STEEL 32D		
123	1.0000	EA.	504109	51	DOOR,CLOSER,W/90 DEGREE HOLD OPEN (OR EQUAL)	SARGENT	1104
124	1.0000	EA.	504128	51	DOOR,PEEP HOLE,200 DEGREE VIEW	BATTALION	1HEW7
125	1.0000	EA.	504400	51	DOOR,DRIP CAP,NGF16A-48"	PEMCO	NGF16A-48
126	1.0000	EA.	504432	51	DOOR,THRESHOLD,42",#8135		
127	1.0000	EA.	504468	51	DOOR,THRESHOLD 48"X8.25",.090 ALUM		
128	1.0000	EA.	504501	51	CORE,LOCKSET,BEST,CONSTRUCT,GREEN		
129	1.0000	EA.	504555	51	DOOR,STRIKER PLATE,STANDARD (OR EQUAL)	ARKANSAS BOLT COMPANY	
130	1.0000	EA.	540216	51	GROUND STRAP ASSY,1/2 BRAIDED,18"		

- DEPT CODES:  
 30 - CONDUIT  
 40 - ELECTRICAL  
 50 - MECHANICAL  
 51 - DOORS  
 55 - HVAC  
 70 - TILE/FLOORING  
 75 - GENERATOR  
 95 - MULTI-TASK  
 99 - PACKING LIST  
 150 - INSTALLATION DEPT

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CUSTOMER:  
**AT&T WIRELESS SERVICES**

PROJECT:  
**11'-5" X 16'-0" CONCRETE SHELTER PARTS LIST CONTINUED**

FILENAME:  
 SATN22  
 SCALE: N.T.S. TOLERANCE:  
 DRWN. BY: J. REEVES DATE: 7/25/13  
 CHK. BY: D. BROYLES DATE: 7/25/13  
 ENG. BY: DATE:  
 APP. BY: D. BRANNEN DATE: 7/25/13  
 SHEET NO. 0-2  
 DRAWING NO.: SATN22 REV.:

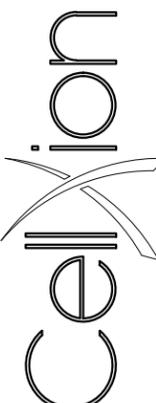
PARTS LIST CONTINUED						
ITEM	QTY	U/M	P/N	DEPT	DESCRIPTION	MFG P/N
131	1.0000	EA.	570005	51	DOOR,CANOPY,48",MOUNTING BRACKET	
132	2.0000	EA.	146514-005	55	DRIP CAP,48"x3",HVAC	
133	183.0000	EA.	320021	70	TILE VINYL,1/8",VINYLASA,VL556	
134	10.0000	FT.	410111	75	CONDUIT,LFMC,3/4",SEALTITE	
135	4.0000	EA.	410129	75	CONNECTOR,LFMC,3/4",STRAIGHT,ST	
136	4.5000	FT.	410232	75	CONDUIT,LFMC,2",SEALTITE	
137	2.0000	EA.	410258	75	CONNECTOR,LFMC,2",STRAIGHT,ST	
138	1.0000	EA.	550146	75	GENERATOR,SHIM PLATE,1/4"x2"x76"	
139	1.0000	EA.	900164	75	GENERATOR,48KW,DSL,GENERAC,SD050	
140	1.0000	EA.	420048	90	LABEL,DATA,STANDARD SHELTER (OR EQUAL)	CELLXION 420048
141	1.0000	EA.	480001	90	PLATE,DATA,ALUM,8"x12",GRAY	CELLXION 480001
142	1.0000	EA.	480000	99	TRAY,WALL FILE PLASTIC,LR-SMOKE (PACKING LIST ITEM)	
143	1.0000	EA.	480087-02	99	PACKING KIT,TYP SHELTER W/6 LUGS (PACKING LIST ITEM)	
144	1.0000	EA.	570018	99	DOOR,CANOPY,54",METAL (PACKING LIST ITEM)	

CUT LIST							
ITEM	QTY	U/M	P/N	DEPT	DESCRIPTION	CUT	PCS
20	1.0000	EA.	430048	30	WIREWAY,GALV,4"x4"x60",W/O KO'S (OR EQUAL)	60"	1
25	1.0000	EA.	430252	30	WIREWAY,GALV,4"x4"x18",W/O KO'S (OR EQUAL)	17"	1
26	1.0000	EA.	430268	30	WIREWAY,GALV,4"x4"x48",W/O KO'S (OR EQUAL)	48"	1
47	32.0000	FT.	410119	40	CONDUIT,LFMC,1",SEALTITE (OR EQUAL)	96"	4
89	42.0000	FT.	400030	50	WIRE,#6 THHN, STRAND, GRN	504"	1
90	79.0000	FT.	400050	50	WIRE,#2 THHN,STRAND,GRN	948"	1
92	60.0000	FT.	400099	50	WIRE,#2 SOLID COPPER,BARE,TINNED	120"	6
93	48.0000	FT.	400099	50	WIRE,#2 SOLID COPPER,BARE,TINNED	144"	4
108	1.0000	EA.	510052	50	CABLE LADDER,24"x9'8 1/2",YELLOW ZI (OR EQUAL)	58 1/8"	1
109	1.0000	EA.	510052	50	CABLE LADDER,24"x9'8 1/2",YELLOW ZI (OR EQUAL)	101 5/8"	1
110	1.0000	EA.	510052	50	CABLE LADDER,24"x9'8 1/2",YELLOW ZI (OR EQUAL)	84 1/8"	1
125	1.0000	EA.	504400	51	DOOR,DRIP CAP,NGF16A-48"	40"	1
134	10.0000	FT.	410111	75	CONDUIT,LFMC,3/4",SEALTITE	60"	2
136	4.5000	FT.	410232	75	CONDUIT,LFMC,2",SEALTITE	54"	1

SHOP DETAILS	
DWG NO.	DESCRIPTION
20-036	TELCO ENTRY STD PVC INSTALLATION
30-002	BOX TO BOX PENETRATION DETAIL
30-004	BOX TO GFCI PENETRATION DETAIL
30-009	CONDUIT TO WIREWAY CONNECTION
30-011	PLASTIC CAPS INSTALLATION
30-012	RIGID, NIPPLE, CLOSE & CHASE APPLICATION
30-013	PANEL TO WIREWAY CONNECTION
40-004	UNISTRUT INSTALLATION
40-008	GROUND BOND DETAIL
50-001	GROUND BAR MOUNTING INSTALLATION
50-006	GROUNDING DETAILS T-JUNCTION
50-008	GROUNDING DETAILS SPLICE JUNCTION
50-012	HALO GROUND TO PANEL & 6X6 BOX
50-013	HALO GROUND TO DOORFRAME
50-020	BONDING AT CONDUIT DETAIL
50-026	Y DROP INSTALLATION-#6 WIRE
50-028	MECHANICAL LUG DETAIL
50-031	Y DROP INSTALLATION-#2 SOLID
50-032	#2 SOLID TO #2 SOLID DETAIL
50-034	HVAC GRILL GROUNDING DETAIL
50-035	THRU WALL PENETRATION 45' PVC PIPE
50-038	HALO GROUND TO WIREWAY
50-042	STAND OFF BRACKET INSTALLATION
50-045	SINGLE CONNECTOR AT STEEL OBJECTS
50-076	LUG TO TELCO GROUND BAR CONNECTION
51-003	2 PC THRESHOLD INSTALLATION
51-005	WEATHERSTRIP INSTALLATION
51-007	DOOR LOCKGUARD INSTALLATION
51-009	DOOR HOLD OPEN INSTALLATION
51-010	DOOR CLOSER DETAIL
51-012	DOOR CANOPY INSTALLATION
51-017	GROUND STRAP TO DOOR FRAME
51-021	PANALIZED SHELTER DOOR HARDWARE INSTALL
51-029	MAGNETIC DOOR ALARM INSTALLATION
52-003	STRAIGHT CLAMP INSTALLATION
52-004	CORNER CLAMP INSTALLATION
52-009	WALL MOUNT INSTALLATION
52-016	WALL BRACKET INSTALLATION
52-018	HANGER BAR CONNECTION
52-021	HANGER BRACKET 1-LAYER INSTALLATION
52-022	UNISTRUT INSTALL 1-LAYER CEILING
53-001	WAVEGUIDE ENTRY INSTALLATION
55-006	HVAC INSTALLATION AND CONNECTIONS
55-010	HVAC DRIP CAP INSTALLATION
80-001	1/2" PVC PIPE STANDOFF

DEPT CODES:  
30 - CONDUIT  
40 - ELECTRICAL  
50 - MECHANICAL  
51 - DOORS  
55 - HVAC  
70 - TILE/FLOORING  
75 - GENERATOR  
95 - MULTI-TASK  
99 - PACKING LIST  
150 - INSTALLATION DEPT

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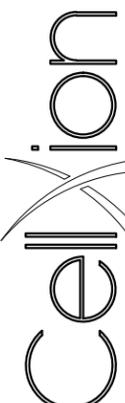
CUSTOMER:  
**AT&T WIRELESS SERVICES**

PROJECT:  
11'-5" X 16'-0"  
CONCRETE SHELTER  
PARTS LIST CONTIN'D  
CUT LIST/SHOP DETAILS

FILENAME: SATN22	
SCALE: N.T.S.	TOLERANCE:
DRWN. BY: J. REEVES	DATE: 7/25/13
CHK. BY: D. BROYLES	DATE: 7/25/13
ENG. BY:	DATE:
APP. BY: D. BRANNEN	DATE: 7/25/13
SHEET NO. 0-3	
DRAWING NO.: SATN22	REV.:

OPTIONAL COMPONENTS										OPTIONAL COMPONENTS												
OPT.	OPT. NO.	TAG NO.	QTY	U/M	PART NO.	DEPT.	DESCRIPTION	CUT	PCS	OPT.	OPT. NO.	TAG NO.	QTY	U/M	PART NO.	DEPT.	DESCRIPTION	CUT	PCS			
A	A1 WAVEGUIDE LOCATION B1	1	27.75	FT.	400050	50	WIRE, #2, THHN, STRANDED, GREEN	333.00	1	D	D1	1	2	EA.	520278	55	HVAC,WALL,4T,5KW,MARVAIR,BGE					
		2	24.75	FT.	400050	50	WIRE, #2, THHN, STRANDED, GREEN	297.00	1			2	1	EA.	460138	30	CONTROLLER,LEAD LAG,COMSTAT 4,MARVA					
		3	35	EA.	410343	50	WIRE STANDOFF,1 3/4"				D2	1	2	EA.	520253	55	HVAC,WALL,4T,5KW,BARD,TAN,RH					
		4	35	EA.	168230	50	SCREW,DECK,#8X1 1/4",PH,ZINC					2	1	EA.	460005	30	CONTROLLER,LEAD LAG,BARD,MC4000-A					
		5	35	EA.	400245	50	CABLE TIE,TYWRAP 8" BLACK,BT2S-MO				D3	1	2	EA.	520280	55	HVAC,WALL,5T,5KW,MARVAIR,BGE					
		6	1	EA.	510052	50	CABLE LADDER,24"X9"8 1/2",YELLOW ZI	35"	2			2	1	EA.	460138	30	CONTROLLER,LEAD LAG,COMSTAT 4,MARVA					
		7	2	EA.	410396	50	BUSHING,INSULATING,CEILING BRACKET				D4	1	2	EA.	520255	55	HVAC,WALL,5T,5KW,BARD,TAN,RH					
		8	2	EA.	510151	50	CABLE LADDER,TRAY HANGER,11"					2	1	EA.	460005	30	CONTROLLER,LEAD LAG,BARD,MC4000-A					
		9	2	EA.	510053	50	CABLE LADDER,24",CLOSING BRACKET,YZ				D5 (FLORIDA)	1	2	EA.	520004	55	HVAC,WALL,5T,5KW,BARD,TAN,RH					
		10	4	EA.	540225	50	GROUND STRAP ASSY,#6 THHN,6" LONG					2	1	EA.	460005	30	CONTROLLER,LEAD LAG,BARD,MC4000-A					
		11	4	EA.	540218	50	GROUND STRAP ASSY,#6 THHN,14 1/2"				1	2	EA.	TBD	55	HVAC,WALL,5T,5KW,MARVAIR,BGE						
	1	46	FT.	400050	50	WIRE, #2, THHN, STRANDED, GREEN	552.00	2	D6	2	1	EA.	460138	30	CONTROLLER,LEAD LAG,COMSTAT 4,MARVA							
	2	43	FT.	400050	50	WIRE, #2, THHN, STRANDED, GREEN	516.00	1		3	1	EA.	TBD	30	CONTROLLER, SAGINAW MARVAIR							
	3	90	EA.	410343	50	WIRE STANDOFF,1 3/4"				4	1	EA.	430005	30	BOX,JUNCT,4"X4",2-1/8D,1/2"-3/4KO							
	4	90	EA.	168230	50	SCREW,DECK,#8X1 1/4",PH,ZINC				5	1	EA.	430012	40	COVER,BLANK PLATE,4X4							
	5	90	EA.	400245	50	CABLE TIE,TYWRAP 8" BLACK,BT2S-MO				6	2	EA.	431181	30	BOX,JUNCT,4-11/16" SQ,D-2 1/8",1"KO							
	6	1	EA.	510052	50	CABLE LADDER,24"X9"8 1/2",YELLOW ZI	35"	2		7	2	EA.	430014	40	COVER,BLANK PLATE,4-11/16"							
	7	3	EA.	410396	50	BUSHING,INSULATING,CEILING BRACKET				8	1	EA.	430366	30	BOX,JUNCT,4X4,WEATHERPROOF,3/4"KO							
	8	3	EA.	510151	50	CABLE LADDER,TRAY HANGER,11"				9	1	EA.	430367	40	COVER,BLANK PLATE,4X4 WP							
	9	1	EA.	510053	50	CABLE LADDER,24",CLOSING BRACKET,YZ				10	1	EA.	410184	30	NIPPLE,RIGID,1/2"X7 1/2"							
	10	4	EA.	540225	50	GROUND STRAP ASSY,#6 THHN,6" LONG				11	12	FT.	410106	30	CONDUIT,EMT,1/2"	144						
	11	2	EA.	540218	50	GROUND STRAP ASSY,#6 THHN,14 1/2"				12	17	FT.	410107	30	CONDUIT,EMT,3/4"	204						
	1	37.5	FT.	400050	50	WIRE, #2, THHN, STRANDED, GREEN	450.00	1	E	E1 (STANDARD)	1	14	EA.	300032	20	INSULATION,1.75"RMAX,POLY,48"X110"						
	2	50	EA.	410343	50	WIRE STANDOFF,1 3/4"					2	4	EA.	300033	20	INSULATION,2.25"RMAX,POLY,48"X132"						
	3	50	EA.	168230	50	SCREW,DECK,#8X1 1/4",PH,ZINC				E2 (FLORIDA)	1	14	EA.	360161	20	INSULATION,RMAX,1 3/4",MULTI-MAX,RM						
	4	50	EA.	400245	50	CABLE TIE,TYWRAP 8" BLACK,BT2S-MO					2	4	EA.	360162	20	INSULATION,RMAX,2 1/4",MULTI-MAX,RM						
	5	1	EA.	510052	50	CABLE LADDER,24"X9"8 1/2",YELLOW ZI	35"	2		3	18	EA.	300069	20	PANELING,POLY.090X4"X10"X3/4 PLY							
	6	3	EA.	410396	50	BUSHING,INSULATING,CEILING BRACKET				F	F1	1	-	-	-	NOT REQUIRED						
	7	3	EA.	510151	50	CABLE LADDER,TRAY HANGER,11"					F2	1	1	EA.	480150	99	MAINTENANCE KIT, ATT					
	8	1	EA.	510053	50	CABLE LADDER,24",CLOSING BRACKET,YZ				G	G1	1	-	-	-	NOT REQUIRED						
	9	4	EA.	540225	50	GROUND STRAP ASSY,#6 THHN,6" LONG					G2	1	1	EA.	460002	30	THERMOSTAT,HI/LOW TEMP,TH-4-20					
	10	2	EA.	540218	50	GROUND STRAP ASSY,#6 THHN,14 1/2"				H	H1	1	1	EA.	221-1105X2400-08	10	CONCRETE FLOOR ASSY KIT,11'5"X24'0"					
	1	1	EA.	430282	40	DISCONNECT,SQD,200A,FUSED,D224NRB					H2	1	1	EA.	221-1105X2400-09	10	CONCRETE FLOOR ASSY KIT,11'5"X24'0"					
B	B1	2	2	EA.	430127	40	FUSE,200 AMP,FLNR200ID			G	G2	2	1	EA.	420011	40	LABEL,BLK,ELECT,"LOW TEMP"					
		3	1	EA.	540104	40	G-BAR KIT,SQUARE D,PTOGTA-6					H	H1	1	1	EA.	221-1105X2400-08	10	CONCRETE FLOOR ASSY KIT,11'5"X24'0"			
		4	1	EA.	400367	50	LUG,2H,#4-1/0,MECH,W/SET SCREW,L125				H2			H2	1	1	EA.	221-1105X2400-09	10	CONCRETE FLOOR ASSY KIT,11'5"X24'0"		
		5	10	FT.	400099	50	WIRE,#2 SOLID COPPER,BARE,TINNED	120	1													
		6	1	EA.	420008	40	LABEL,BLK,ELECT,"SERVICE DISCONNCT"															
		1	1	EA.	170125	30	PIPE CAP,PLASTIC,NPT,NIAGARA #257															
C	B2	2	1	EA.	410080	30	BUSHING,2",PLASTIC															
		1	1	EA.	504500	51	LOCKSET,PB,CYD,SIMPLEX,LEVER,LL102															
		2	1	EA.	500001	51	DOOR,3070,CURRIES,LH/RHT,18G															
		3	1	EA.	504222	51	DOOR,WEATHERSTRIPPING,303-TF-3670															
		4	3	FT.	504216	51	DOOR,WEATHERSTRIP,SPONGE NEOPRENE															
	C2 (FLORIDA)	5	1	EA.	504300	51	DOOR,LOCKGUARD,10" 32D															
		1	1	EA.	504625	51	LOCKSET,ENT/DB,MRT,RUSSWIN,RH,ML202															
		2	1	EA.	500157	51	DOOR,3070,RH,CURRIES,16G,MORTISE															
		3	1	EA.	504220	51	DOOR,WEATHERSTRIP,P&S,S88BK-204															
		4	1	EA.	504303	51	DOOR,LOCKGUARD,MLP-111-630 3'X11'SS															

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CUSTOMER:  
**AT&T WIRELESS SERVICES**

PROJECT:  
**11'-5" X 16'-0" CONCRETE SHELTER OPTIONAL COMPONENTS**

FILENAME: SATN22	
SCALE: N.T.S.	TOLERANCE:
DRWN. BY: J. REEVES	DATE: 7/25/13
CHK. BY: D. BROYLES	DATE: 7/25/13
ENG. BY:	DATE:
APP. BY: D. BRANNEN	DATE: 7/25/13
SHEET NO. 0-4	
DRAWING NO.: SATN22	REV.:

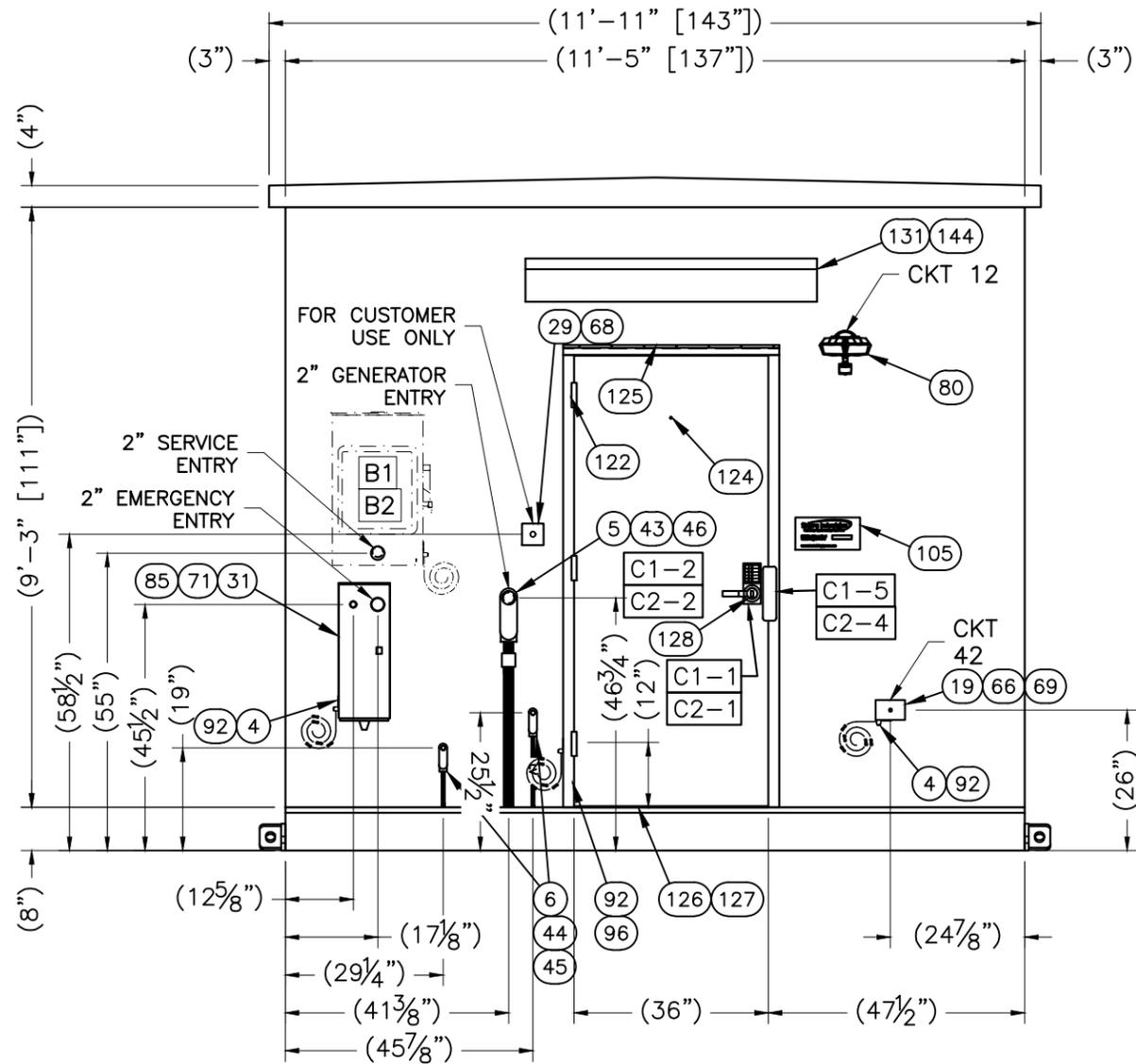
SHELTER REQUIRES ONE OPTION NUMBER FROM EACH OPTION LISTED.

NOTE THAT SOME OPTION NUMBERS ARE A KIT W/ MULTIPLE PARTS.

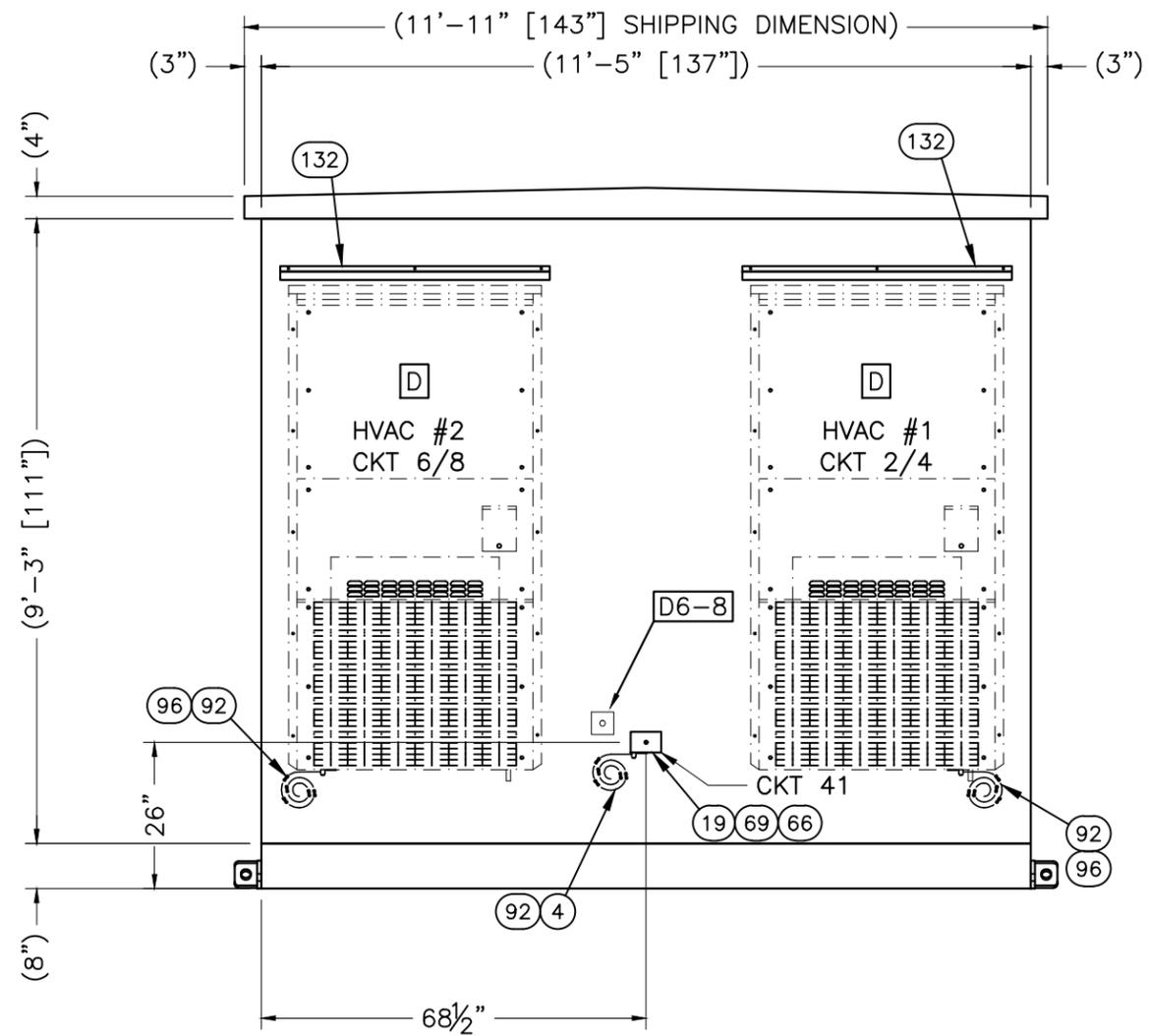
OPTIONS ARE IDENTIFIED ON THE DRAWING BY THE OPTION LETTER [X], BY OPTION NO. [XX], OR BY THE OPTION TAG NO. [XX-X]

- DEPT CODES:
- 30 - CONDUIT
  - 40 - ELECTRICAL
  - 50 - MECHANICAL
  - 51 - DOORS
  - 55 - HVAC
  - 70 - TILE/FLOORING
  - 75 - GENERATOR
  - 95 - MULTI-TASK
  - 99 - PACKING LIST
  - 150 - INSTALLATION DEPT

SUB-PARTS LIST			
ITEM	P/N	ORIGINAL DESCRIPTION	CUT
92	400099	WIRE,#2 SOLID COPPER,BARE,TINNED	120"
125	504400	DOOR,DRIP CAP,NGF16A-48"	40"



EXTERIOR ELEVATION "A"



EXTERIOR ELEVATION "C"

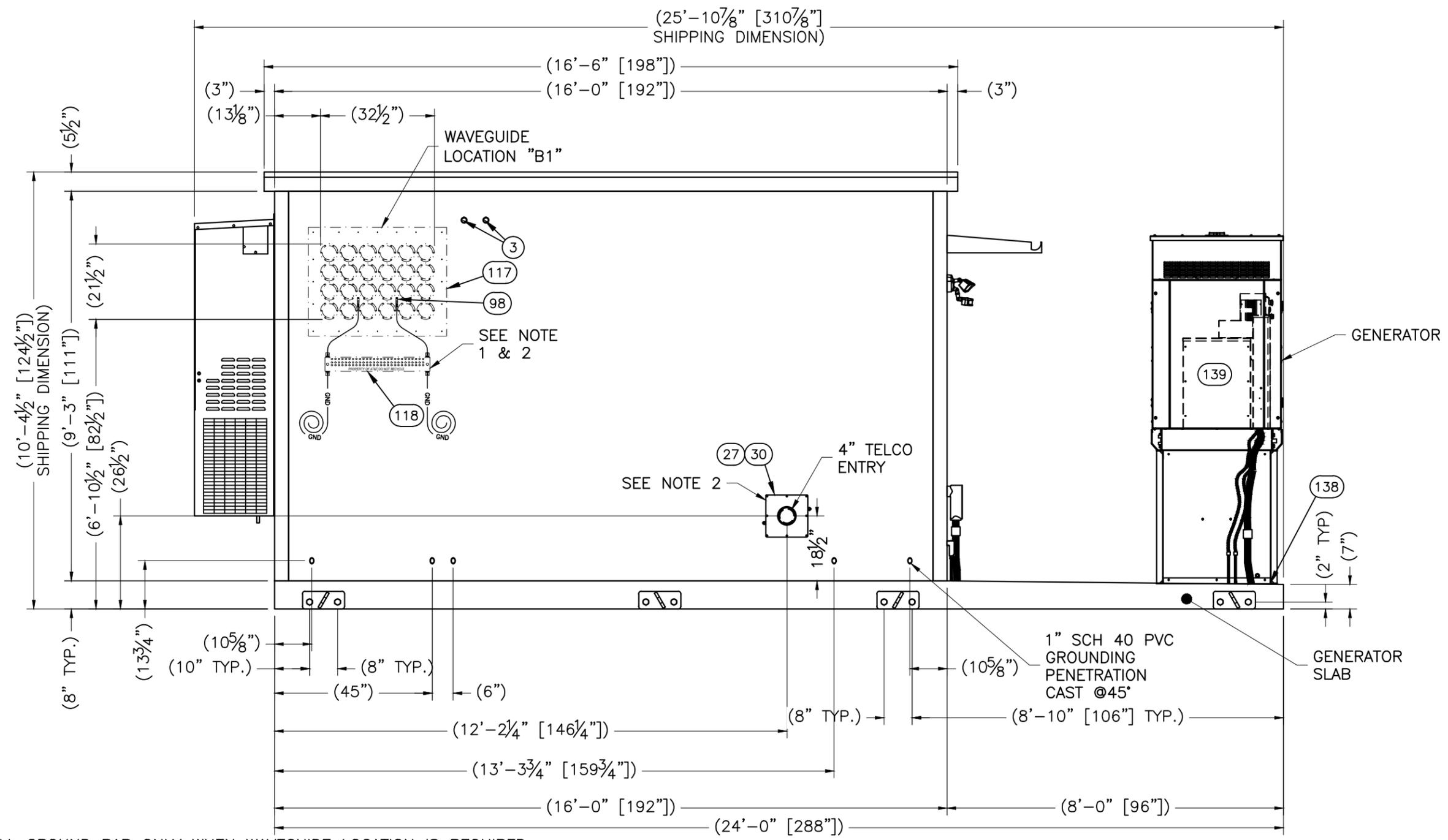
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CUSTOMER:  
**AT&T WIRELESS SERVICES**

PROJECT:  
**11'-5" X 16'-0" CONCRETE SHELTER EXTERIOR ELEVATIONS "A" & "C"**

FILENAME: SATN22	
SCALE: 3/8" = 1'-0"	TOLERANCE:
DRWN. BY: J. REEVES	DATE: 7/25/13
CHK. BY: D. BROYLES	DATE: 7/25/13
ENG. BY:	DATE:
APP. BY: D. BRANNEN	DATE: 7/25/13
SHEET NO. 1-0	
DRAWING NO.: SATN22	REV.:



- NOTES:**
1. INSTALL GROUND BAR ONLY WHEN WAVEGUIDE LOCATION IS REQUIRED. PLACE GROUND BAR 6" BELOW WAVEGUIDE AND CENTERED.
  2. REMOVE FOR SHIPPING.
  3. ONLY (1) WAVEGUIDE WILL BE INSTALLED AND UTILIZED.

**EXTERIOR ELEVATION "B"**

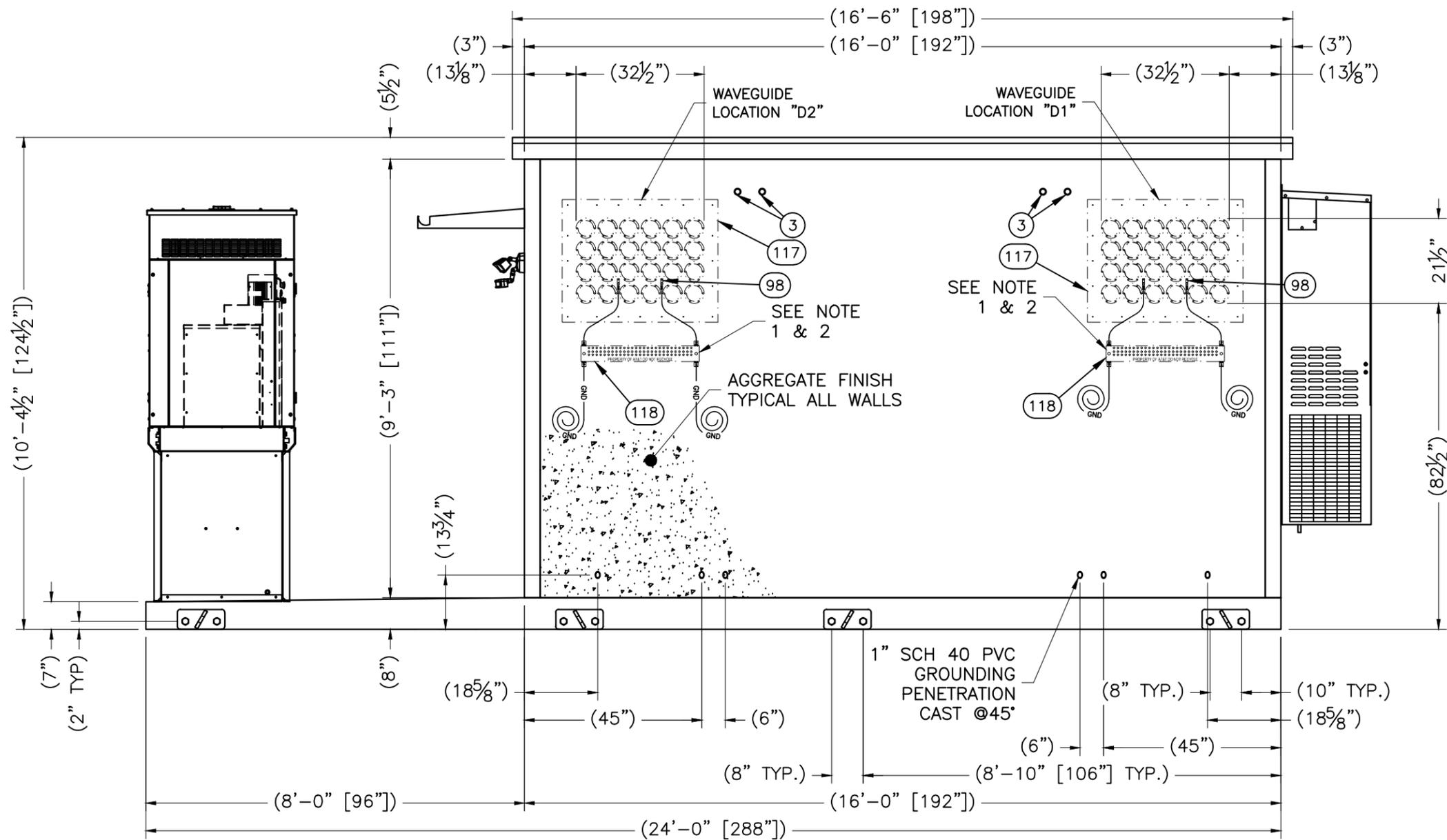
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CUSTOMER:  
**AT&T WIRELESS SERVICES**

PROJECT:  
**11'-5" X 16'-0" CONCRETE SHELTER EXTERIOR ELEVATION "B"**

FILENAME: SATN22	
SCALE: 3/8" = 1'-0"	TOLERANCE:
DRWN. BY: J. REEVES	DATE: 7/25/13
CHK. BY: D. BROYLES	DATE: 7/25/13
ENG. BY:	DATE:
APP. BY: D. BRANNEN	DATE: 7/25/13
SHEET NO. 1-1	
DRAWING NO.: SATN22	REV.:



EXTERIOR ELEVATION "D"

NOTES:

1. INSTALL GROUND BAR ONLY WHEN WAVEGUIDE LOCATION IS REQUIRED. PLACE GROUND BAR 6" BELOW WAVEGUIDE AND CENTERED.
2. REMOVE FOR SHIPPING.
3. ONLY (1) WAVEGUIDE WILL BE INSTALLED AND UTILIZED.

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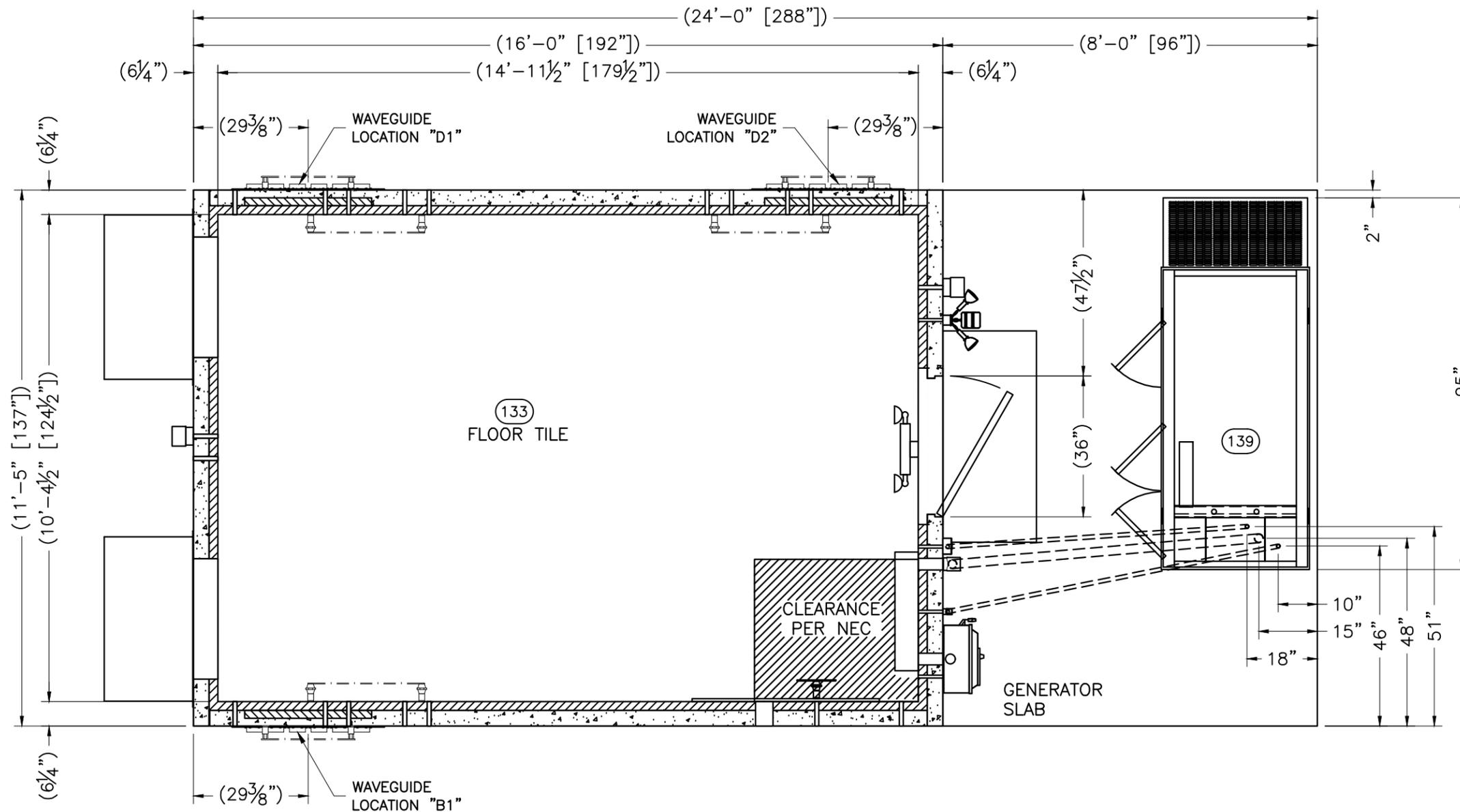
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 voice: (318) 213-2900  
 fax: (318) 213-2919  
 www.cellxion.com

CUSTOMER:  
**AT&T WIRELESS SERVICES**

PROJECT:  
**11'-5" X 16'-0" CONCRETE SHELTER EXTERIOR "D" ELEVATION**

FILENAME: SATN22	
SCALE: 3/8" = 1'-0"	TOLERANCE:
DRWN. BY: J. REEVES	DATE: 7/25/13
CHK. BY: D. BROYLES	DATE: 7/25/13
ENG. BY:	DATE:
APP. BY: D. BRANNEN	DATE: 7/25/13
SHEET NO. 1-2	
DRAWING NO.: SATN22	REV.:

SUB-PARTS LIST			
ITEM	P/N	ORIGINAL DESCRIPTION	PCS
133	320021	TILE VINYL,1/8",VINYLASA,VL556	183



**FLOOR PLAN (OPTION "H1")**  
 182.67 SQ. FT. EXTERIOR AREA  
 155.19 SQ. FT. INTERIOR AREA

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**cellxion**

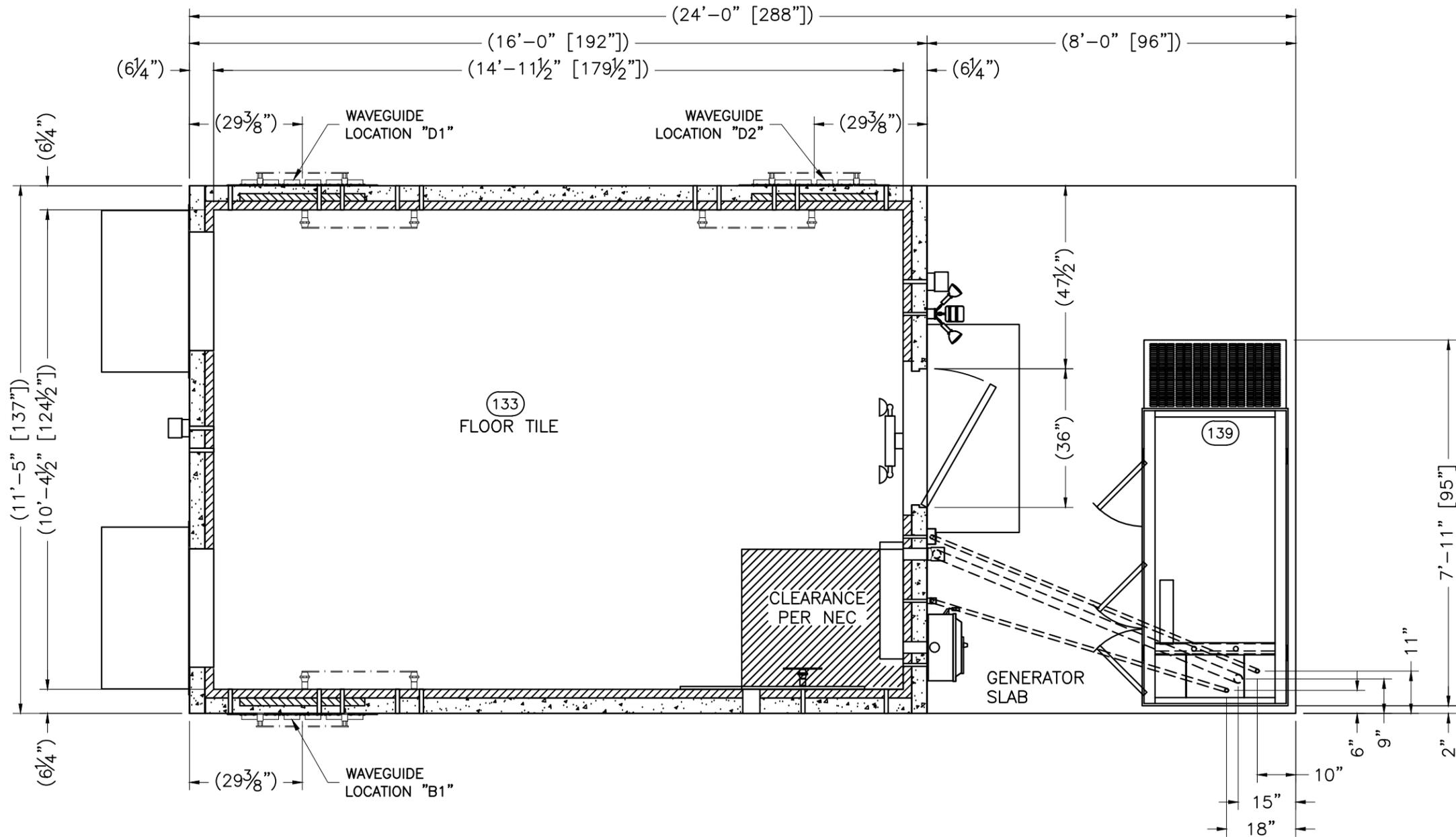
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 Bossier City, Louisiana 71111  
 voice: (318) 213-2900  
 fax: (318) 213-2919  
 www.cellxion.com

CUSTOMER:  
**AT&T WIRELESS SERVICES**

PROJECT:  
**11'-5" X 16'-0" CONCRETE SHELTER FLOOR PLAN, OPTION "H1"**

FILENAME: SATN22	
SCALE: 3/8" = 1'-0"	TOLERANCE:
DRWN. BY: J. REEVES	DATE: 7/25/13
CHK. BY: D. BROYLES	DATE: 7/25/13
ENG. BY:	DATE:
APP. BY: D. BRANNEN	DATE: 7/25/13
SHEET NO. 2-0	
DRAWING NO.: SATN22	REV.:

SUB-PARTS LIST			
ITEM	P/N	ORIGINAL DESCRIPTION	PCS
133	320021	TILE VINYL,1/8",VINYLASA,VL556	183



**FLOOR PLAN (OPTION "H2")**  
 182.67 SQ. FT. EXTERIOR AREA  
 155.19 SQ. FT. INTERIOR AREA

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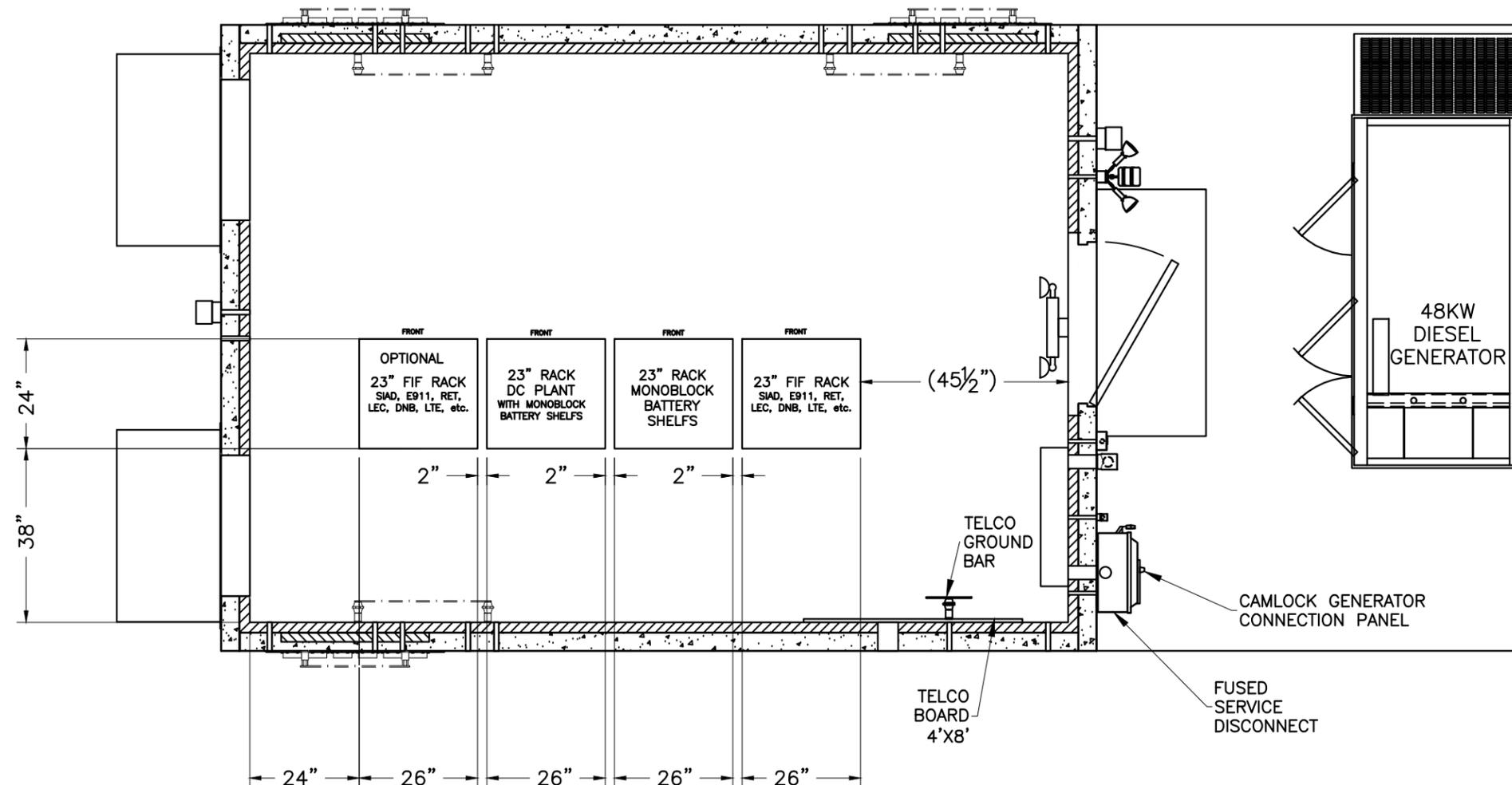
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 fax: (318) 213-2919  
 www.cellxion.com

CUSTOMER:  
**AT&T WIRELESS SERVICES**

PROJECT:  
**11'-5" X 16'-0" CONCRETE SHELTER FLOOR PLAN, OPTION "H2"**

FILENAME: SATN22	
SCALE: 3/8" = 1'-0"	TOLERANCE:
DRWN. BY: J. REEVES	DATE: 7/25/13
CHK. BY: D. BROYLES	DATE: 7/25/13
ENG. BY:	DATE:
APP. BY: D. BRANNEN	DATE: 7/25/13
SHEET NO. 2-1	
DRAWING NO.: SATN22	REV.:



EQUIPMENT LAYOUT

NOTES:

- BATTERY RACK TO CONTAIN (20) GNB M12V155FT VRLA BATTERIES AT 155Ah EACH WITH A TOTAL ELECTROLYTE CAPACITY OF 28 GALLONS. 24VDC CAPACITY OF 1550Ah OR -48VDC CAPACITY OF 775Ah.
- SET HVAC FRESH AIR DAMPER TO 15% OUTSIDE AIR. THIS WILL SUPPLY MIN. 155CFM TO BATTERY VENTILATION.

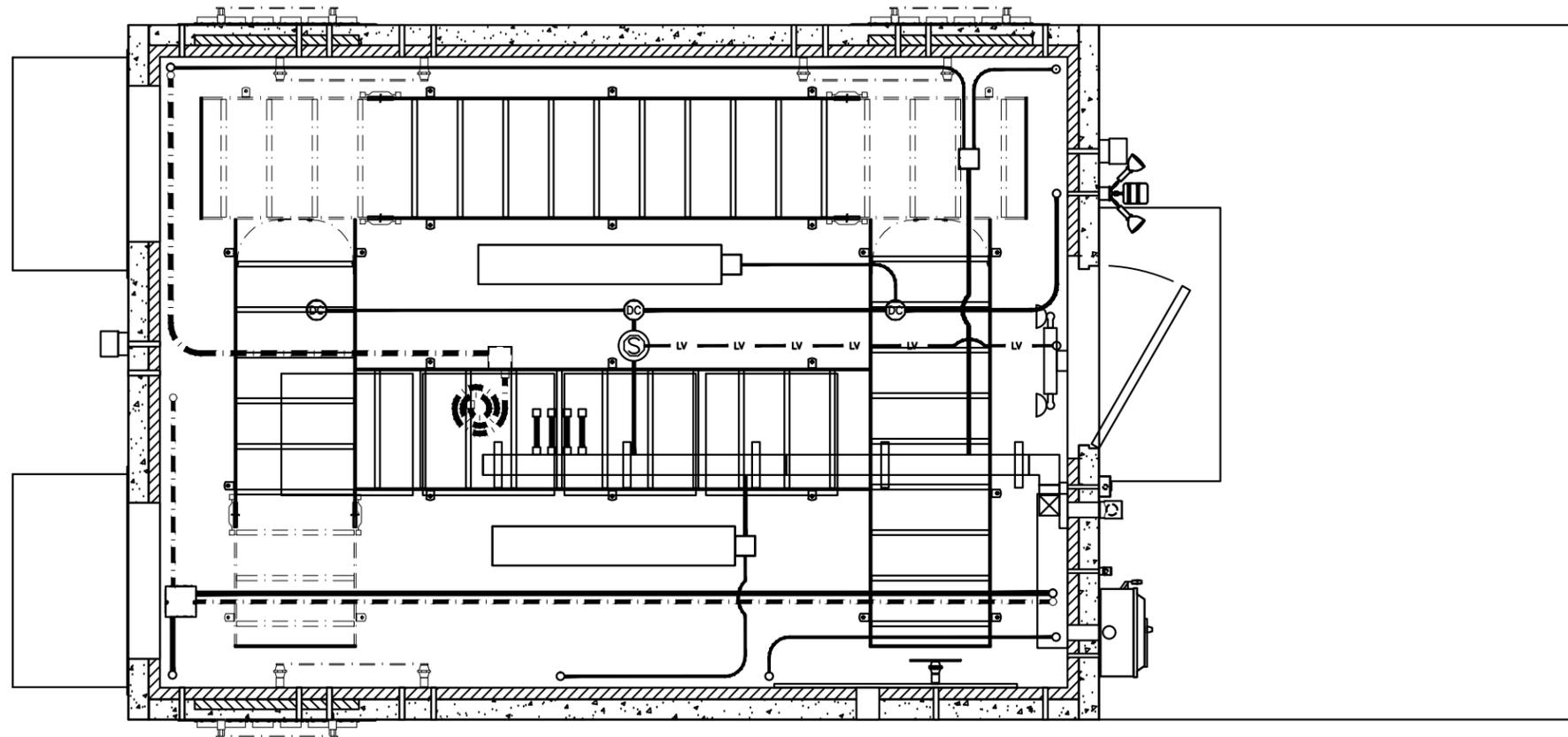
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CUSTOMER:  
**AT&T WIRELESS SERVICES**

PROJECT:  
**11'-5" X 16'-0" CONCRETE SHELTER EQUIPMENT LAYOUT**

FILENAME: SATN22	
SCALE: 3/8" = 1'-0"	TOLERANCE:
DRWN. BY: J. REEVES	DATE: 7/25/13
CHK. BY: D. BROYLES	DATE: 7/25/13
ENG. BY:	DATE:
APP. BY: D. BRANNEN	DATE: 7/25/13
SHEET NO. 2-2	
DRAWING NO.: SATN22	REV.:



REFLECTED CEILING PLAN  
OVERLAY

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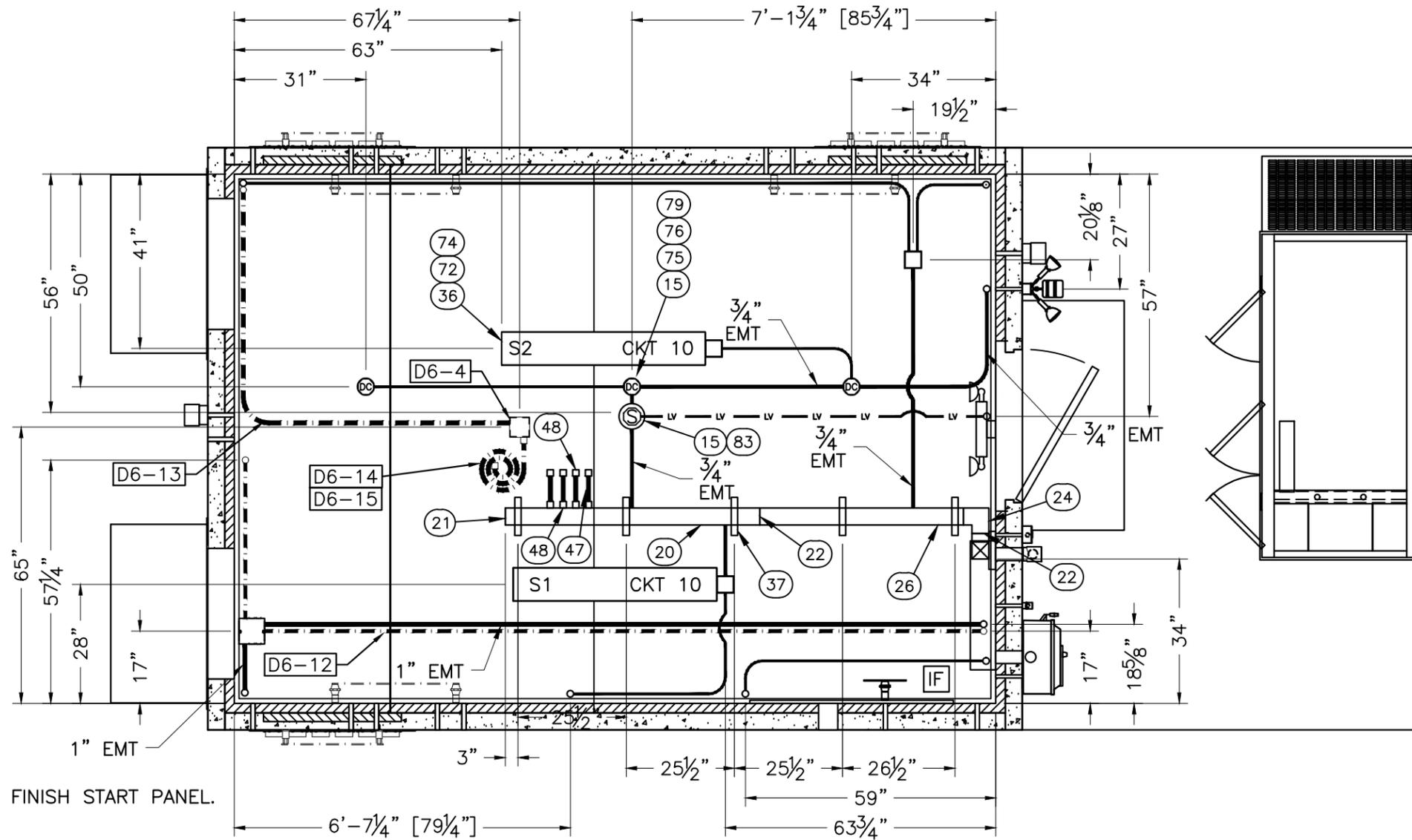
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CUSTOMER:  
**AT&T WIRELESS SERVICES**

PROJECT:  
**11'-5" X 16'-0" CONCRETE SHELTER REFLECTED CEILING PLAN OVERLAY**

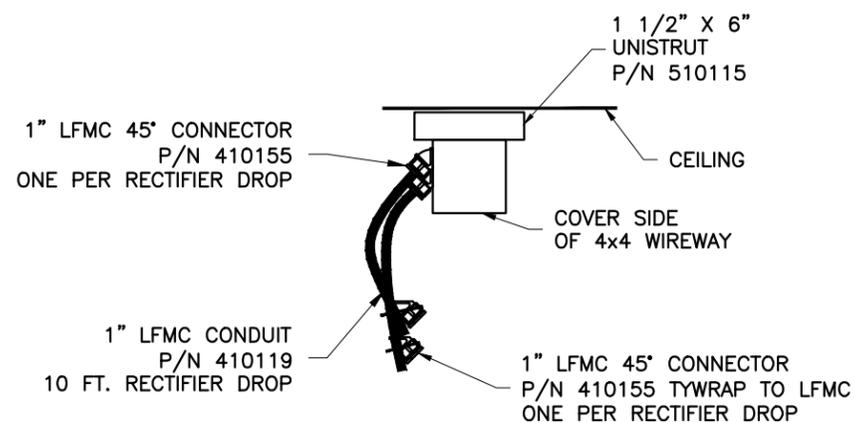
FILENAME: SATN22	
SCALE: 3/8" = 1'-0"	TOLERANCE:
DRWN. BY: J. REEVES	DATE: 7/25/13
CHK. BY: D. BROYLES	DATE: 7/25/13
ENG. BY:	DATE:
APP. BY: D. BRANNEN	DATE: 7/25/13
SHEET NO. 2-3	
DRAWING NO.: SATN22	REV.:

SUB-PARTS LIST			
ITEM	P/N	DESCRIPTION	CUT
20	430048	WIREWAY,GALV,4"x4"x60",W/O KO'S (OR EQUAL)	60"
26	430268	WIREWAY,GALV,4"x4"x48",W/O KO'S (OR EQUAL)	48"
47	410119	CONDUIT,LFMC,1",SEALTITE (OR EQUAL)	96"

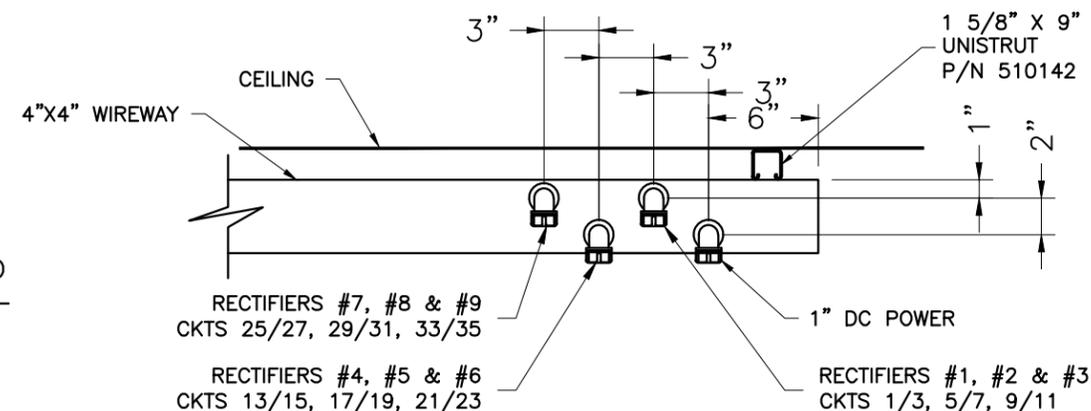


- NOTES:
1. IF = INTERIOR FINISH START PANEL.

REFLECTED CEILING PLAN  
ELECTRICAL



RECTIFIER DROP  
DETAILS



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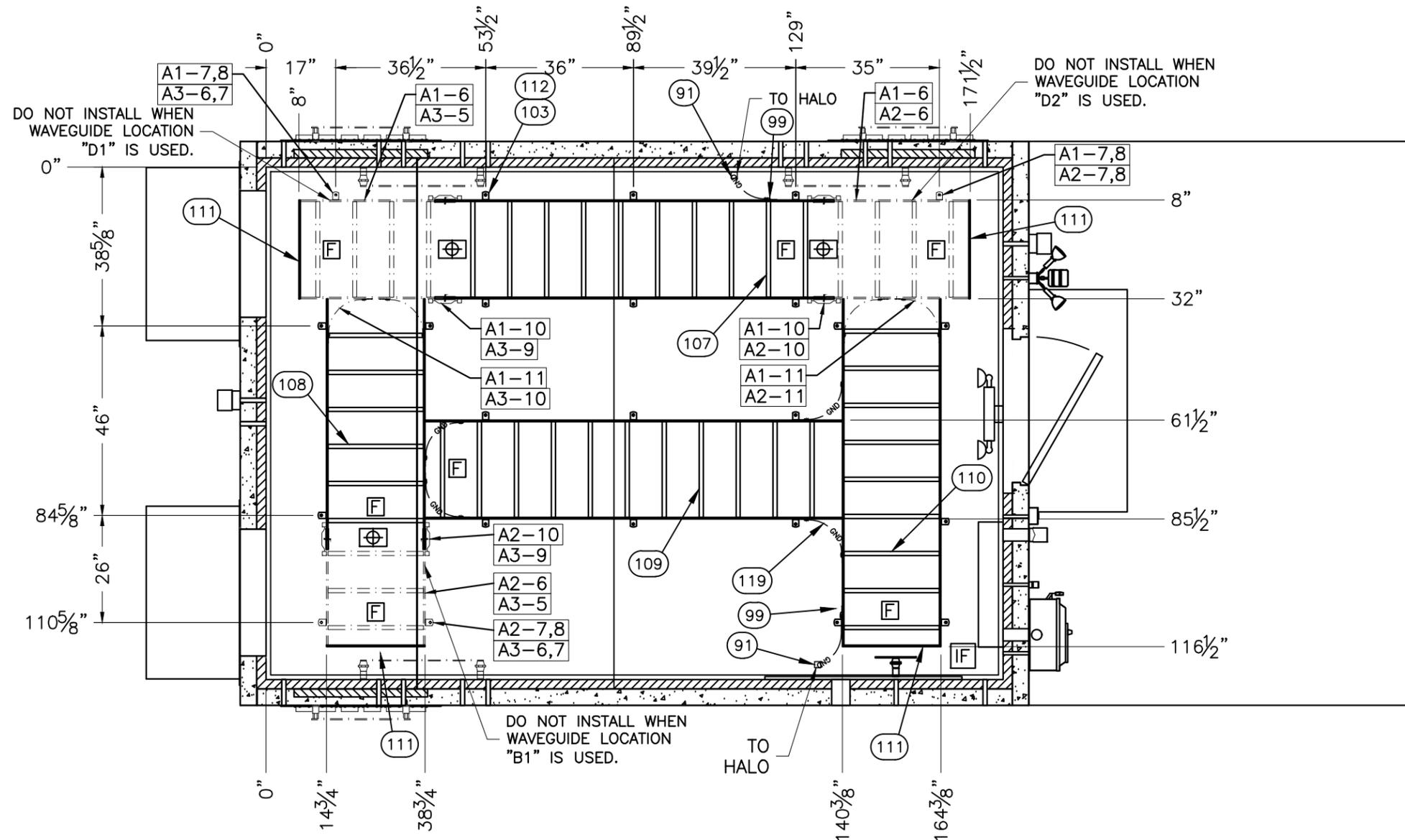
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CUSTOMER:  
**AT&T WIRELESS SERVICES**

PROJECT:  
**11'-5" X 16'-0" CONCRETE SHELTER REFLECTED CEILING PLAN (OVERLAY)**

FILENAME: SATN22	
SCALE: 3/8" = 1'-0"	TOLERANCE:
DRWN. BY: J. REEVES	DATE: 7/25/13
CHK. BY: D. BROYLES	DATE: 7/25/13
ENG. BY:	DATE:
APP. BY: D. BRANNEN	DATE: 7/25/13
SHEET NO. 3-0	
DRAWING NO.:	REV.:
SATN22	

SUB-PARTS LIST			
ITEM	P/N	ORIGINAL DESCRIPTION	CUT
107	510052	CABLE LADDER,24"x9'8 1/2",YELLOW ZI	
108	510052	CABLE LADDER,24"x9'8 1/2",YELLOW ZI	58 1/8"
109	510052	CABLE LADDER,24"x9'8 1/2",YELLOW ZI	101 5/8"
110	510052	CABLE LADDER,24"x9'8 1/2",YELLOW ZI	84 1/8"



NOTES:

1. F = CABLE LADDER FACTORY END
2. ⊕ = CABLE LADDER SPLICE.
3. IF = INTERIOR FINISH START PANEL.
4. CABLE TRAY TO BE MOUNTED 8'-0 1/2" (96.5") A.F.F.

REFLECTED CEILING PLAN  
MECHANICAL

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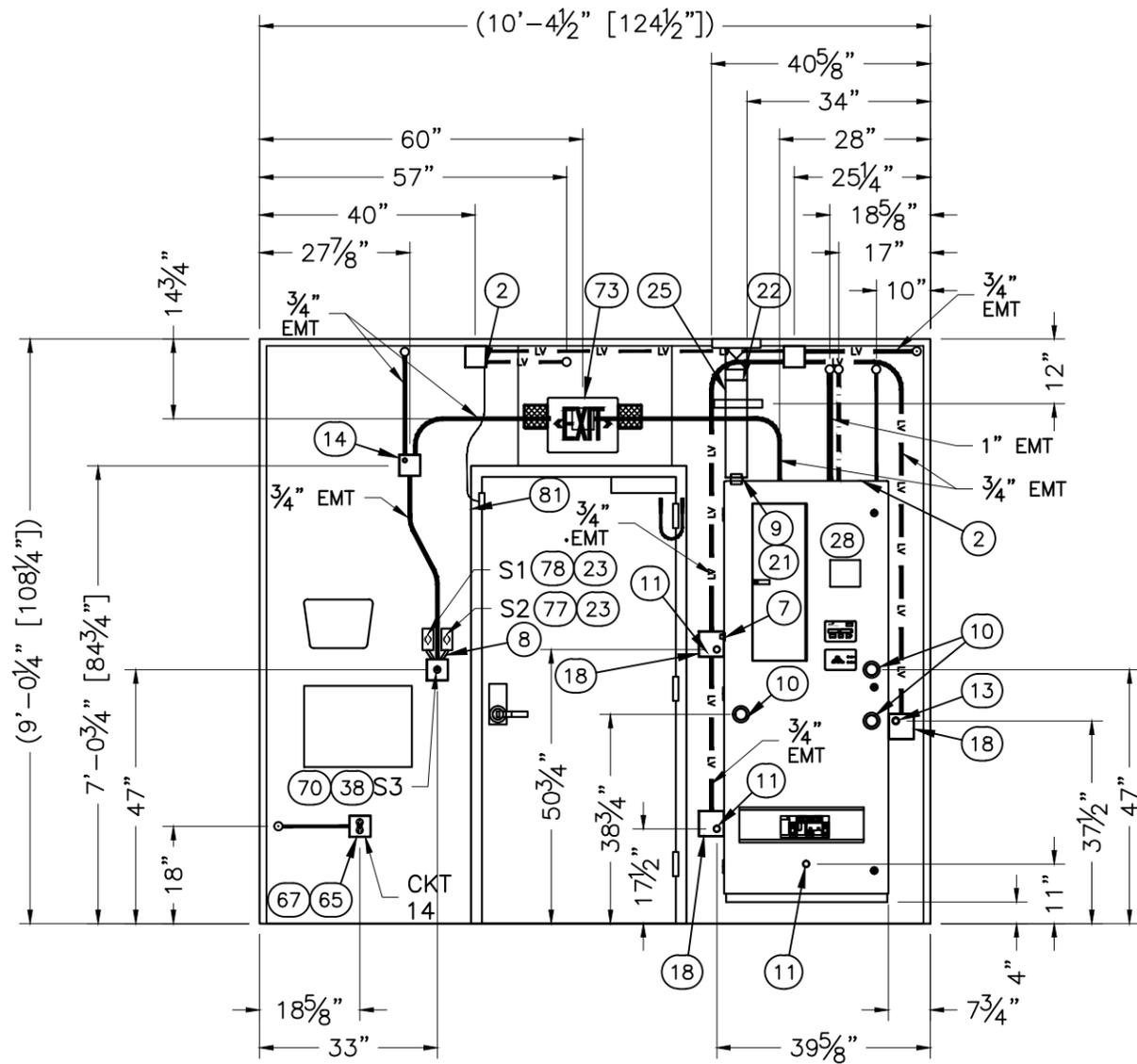
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CUSTOMER:  
**AT&T WIRELESS SERVICES**

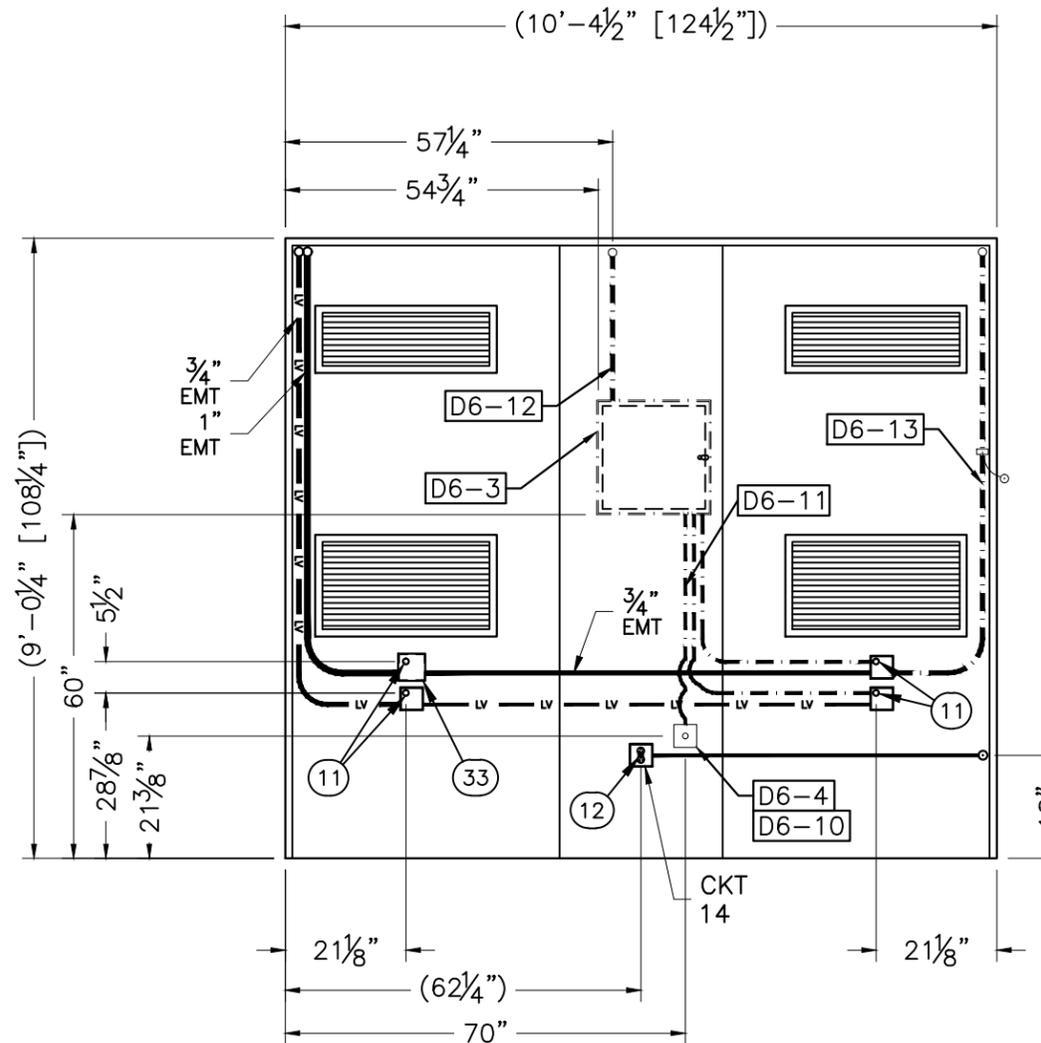
PROJECT:  
**11'-5" X 16'-0" CONCRETE SHELTER REFLECTED CEILING PLAN (MECHANICAL)**

FILENAME: SATN22	
SCALE: 3/8" = 1'-0"	TOLERANCE:
DRWN. BY: J. REEVES	DATE: 7/25/13
CHK. BY: D. BROYLES	DATE: 7/25/13
ENG. BY:	DATE:
APP. BY: D. BRANNEN	DATE: 7/25/13
SHEET NO. 3-1	
DRAWING NO.: SATN22	REV.:

SUB-PARTS LIST			CUT
ITEM	P/N	ORIGINAL DESCRIPTION	
25	430252	WIREWAY,GALV,4"x4"x18",W/O KO'S	17"



INTERIOR ELEVATION "A"  
ELECTRICAL



INTERIOR ELEVATION "C"  
ELECTRICAL

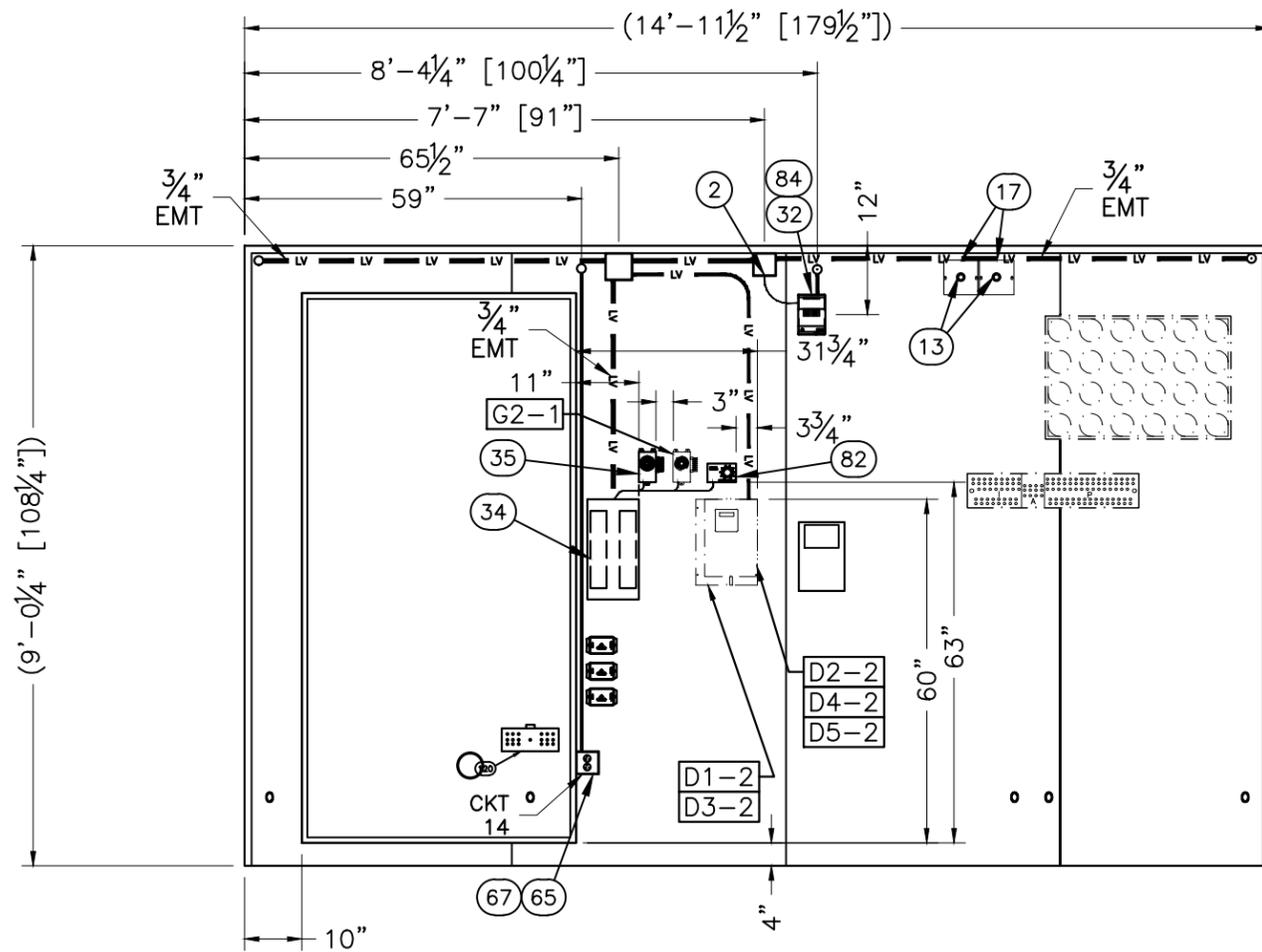
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CUSTOMER:  
**AT&T WIRELESS SERVICES**

PROJECT:  
**11'-5" X 16'-0" CONCRETE SHELTER INTERIOR ELEVATIONS "A" & "C"**

FILENAME: SATN22	
SCALE: 3/8" = 1'-0"	TOLERANCE:
DRWN. BY: J. REEVES	DATE: 7/25/13
CHK. BY: D. BROYLES	DATE: 7/25/13
ENG. BY:	DATE:
APP. BY: D. BRANNEN	DATE: 7/25/13
SHEET NO. 4-0	
DRAWING NO.: SATN22	REV.:



INTERIOR ELEVATION "B"  
ELECTRICAL

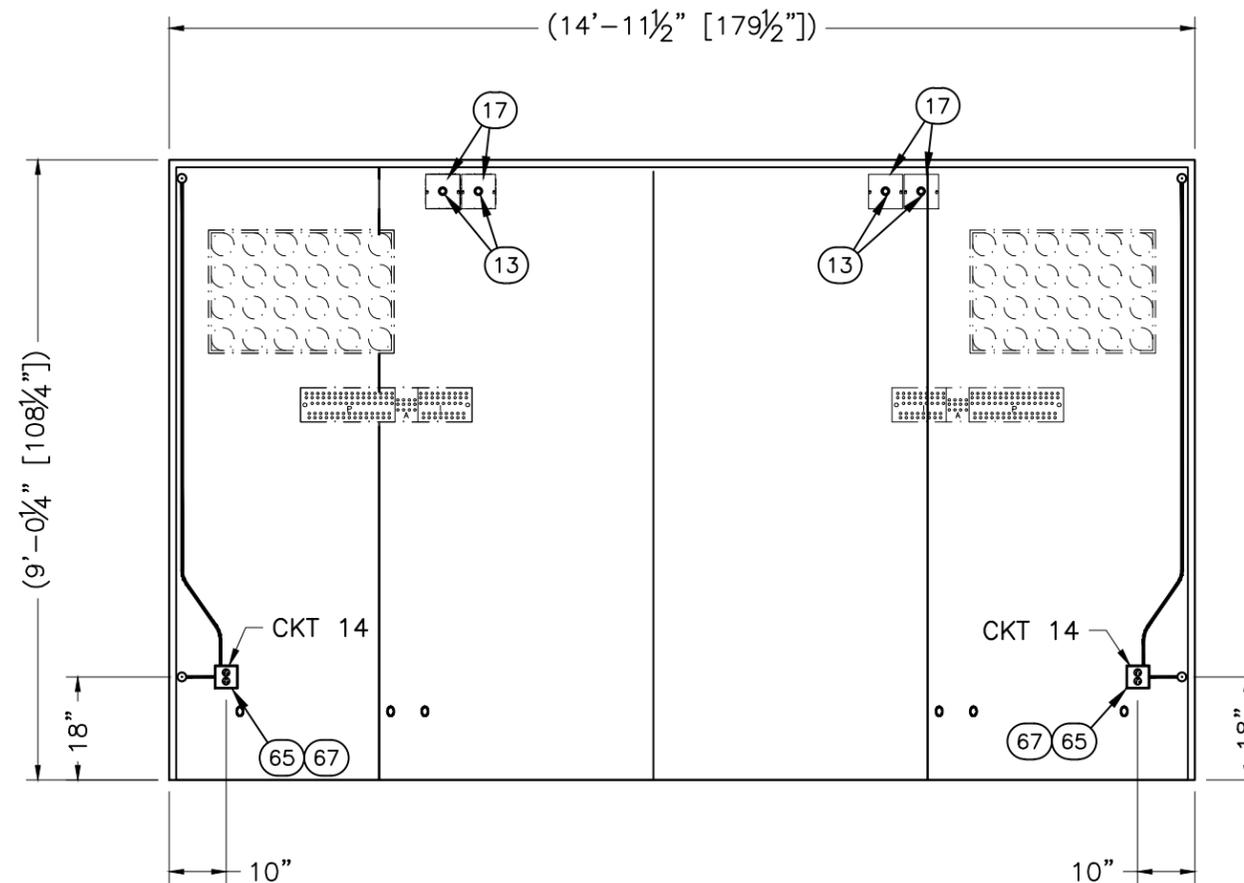
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CUSTOMER:  
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PROJECT:  
**11'-5" X 16'-0" CONCRETE SHELTER INTERIOR ELEVATION "B" (ELECTRICAL)**

FILENAME: SATN22	
SCALE: 3/8" = 1'-0"	TOLERANCE:
DRWN. BY: J. REEVES	DATE: 7/25/13
CHK. BY: D. BROYLES	DATE: 7/25/13
ENG. BY:	DATE:
APP. BY: D. BRANNEN	DATE: 7/25/13
SHEET NO. 4-1	
DRAWING NO.: SATN22	REV.:



INTERIOR ELEVATION "D"  
ELECTRICAL

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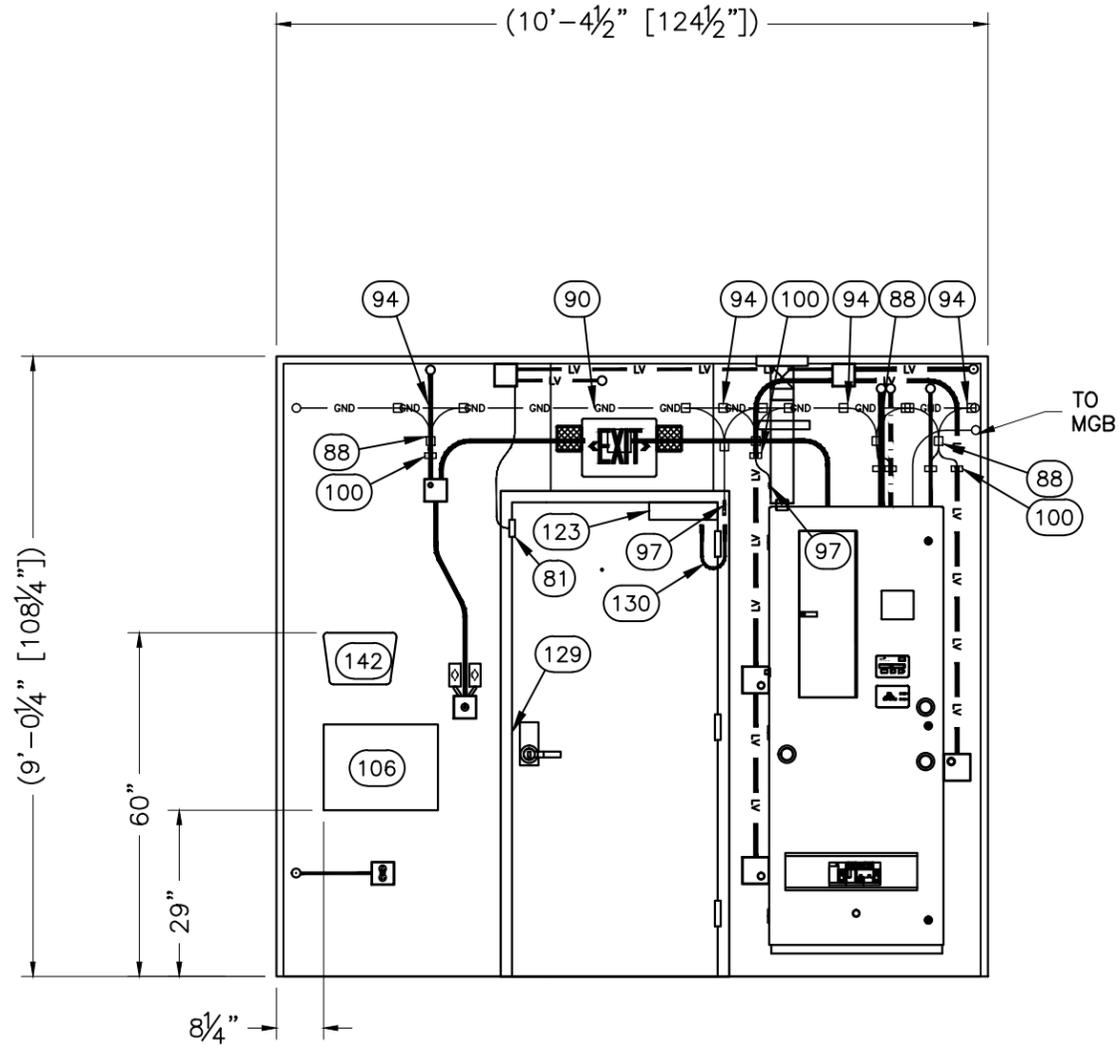
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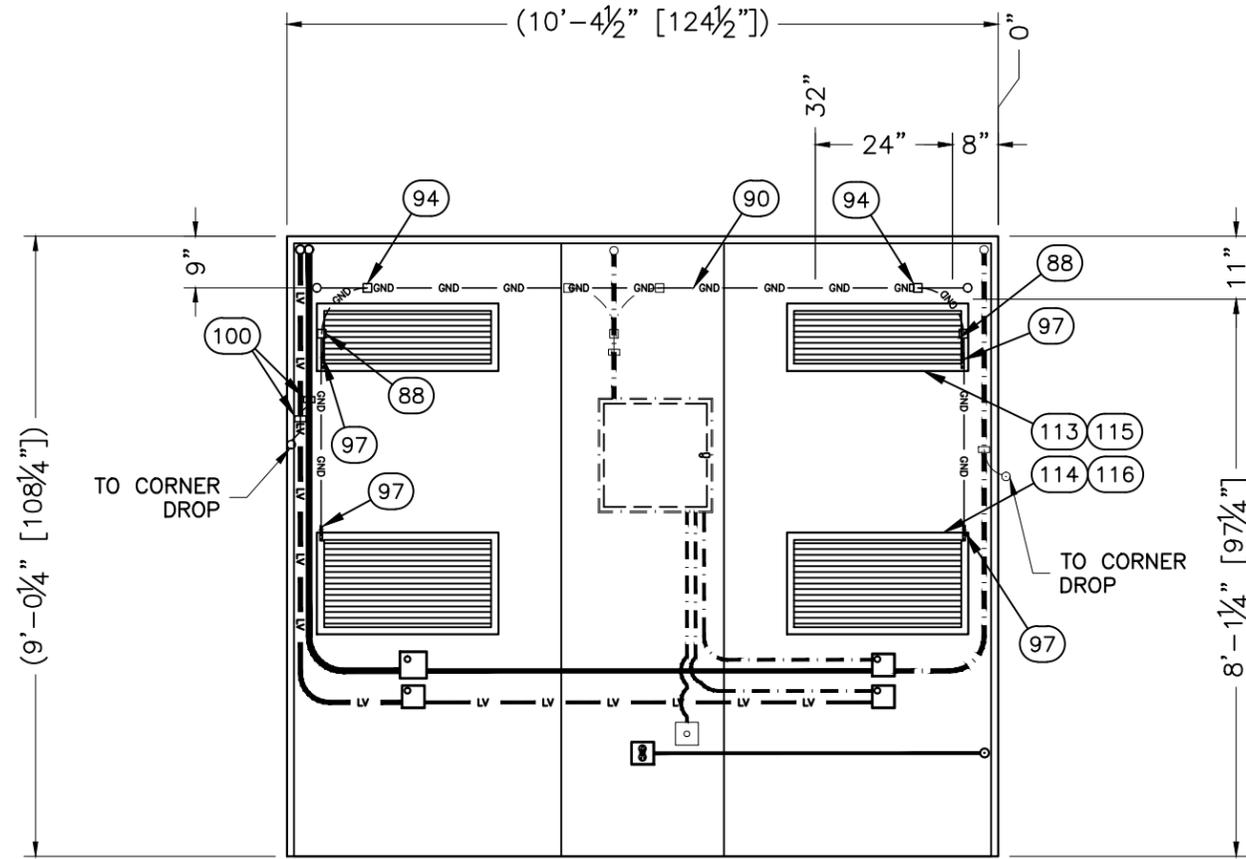
PROJECT:  
**11'-5" X 16'-0" CONCRETE SHELTER INTERIOR ELEVATION "D"**

FILENAME: SATN22	
SCALE: 3/8" = 1'-0"	TOLERANCE:
DRWN. BY: J. REEVES	DATE: 7/25/13
CHK. BY: D. BROYLES	DATE: 7/25/13
ENG. BY:	DATE:
APP. BY: D. BRANNEN	DATE: 7/25/13
SHEET NO. 4-2	
DRAWING NO.: SATN22	REV.:

SUB-PARTS LIST			
ITEM	P/N	ORIGINAL DESCRIPTION	CUT
89	400030	WIRE, #6 THHN, STRAND, GRN	504"



INTERIOR ELEVATION "A"  
MECHANICAL



INTERIOR ELEVATION "C"  
MECHANICAL

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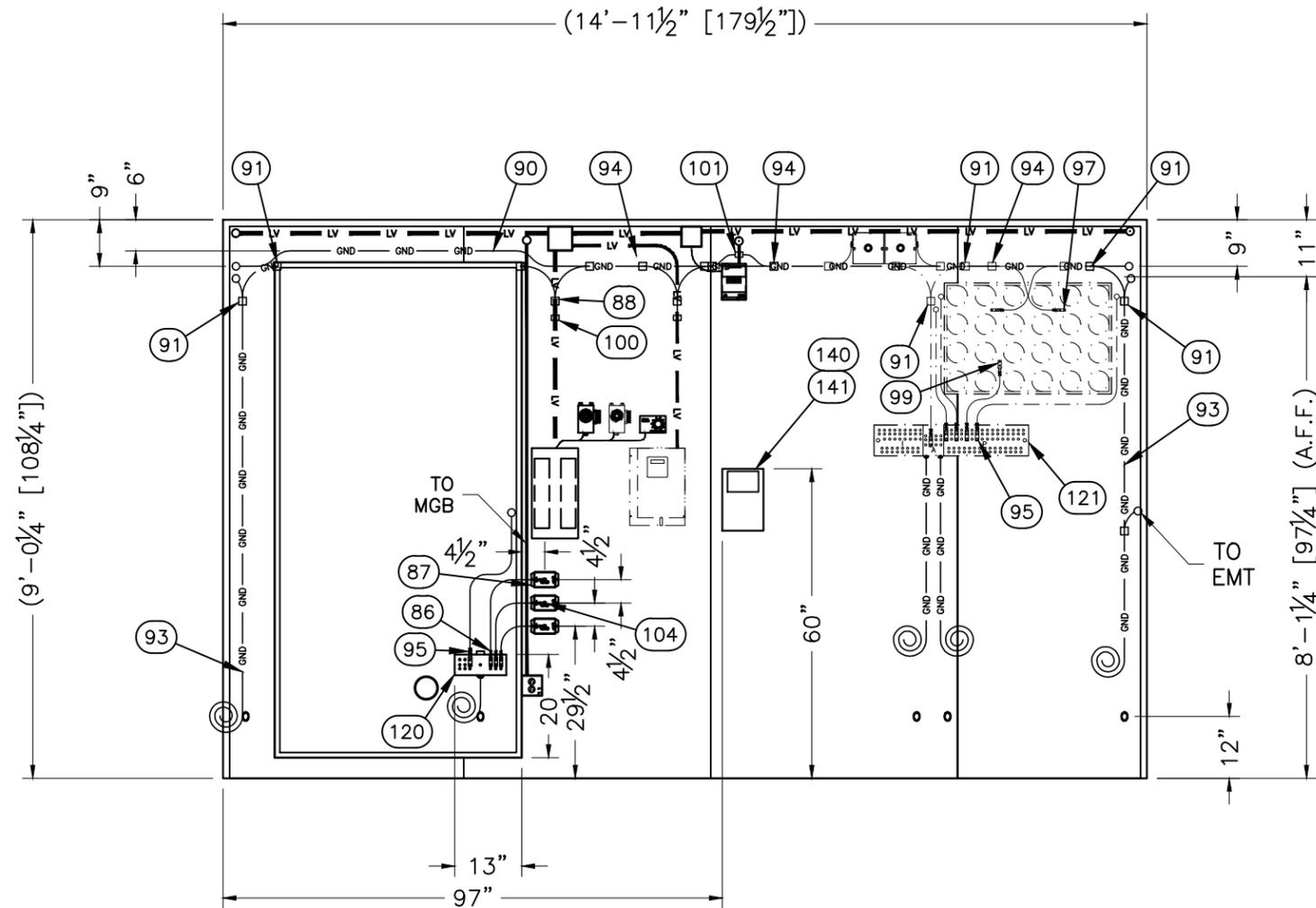
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CUSTOMER:  
**AT&T WIRELESS SERVICES**

PROJECT:  
**11'-5" X 16'-0" CONCRETE SHELTER INTERIOR ELEVATIONS "A" & "C" (MECHANICAL)**

FILENAME: SATN22	
SCALE: 3/8" = 1'-0"	TOLERANCE:
DRWN. BY: J. REEVES	DATE: 7/25/13
CHK. BY: D. BROYLES	DATE: 7/25/13
ENG. BY:	DATE:
APP. BY: D. BRANNEN	DATE: 7/25/13
SHEET NO. 5-0	
DRAWING NO.: SATN22	REV.:

SUB-PARTS LIST			
ITEM	P/N	ORIGINAL DESCRIPTION	CUT
93	400099	WIRE,#2 SOLID COPPER,BARE,TINNED	144"



INTERIOR ELEVATION "B"  
MECHANICAL

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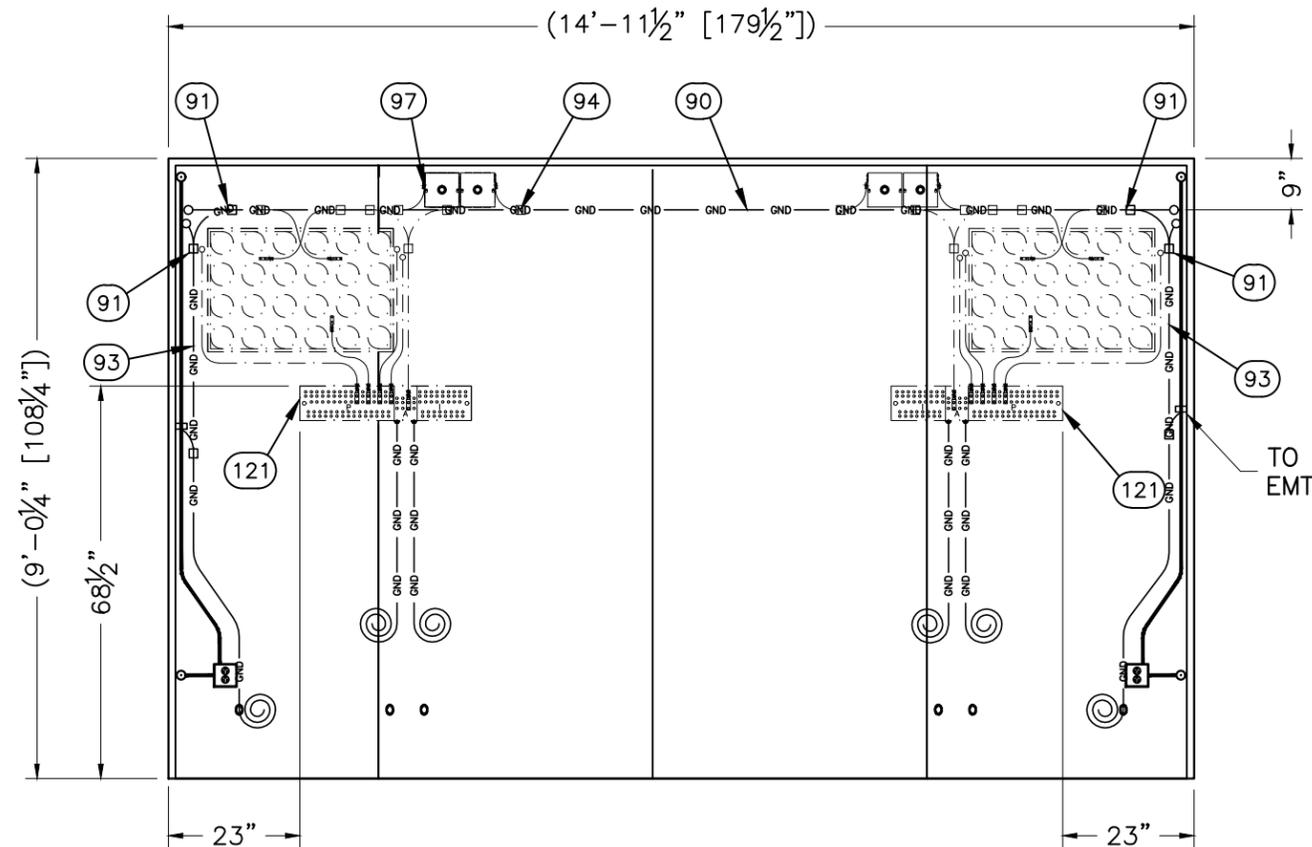
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CUSTOMER:  
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PROJECT:  
**11'-5" X 16'-0" CONCRETE SHELTER INTERIOR ELEVATION "B" (MECHANICAL)**

FILENAME: SATN22	
SCALE: 3/8" = 1'-0"	TOLERANCE:
DRWN. BY: J. REEVES	DATE: 7/25/13
CHK. BY: D. BROYLES	DATE: 7/25/13
ENG. BY:	DATE:
APP. BY: D. BRANNEN	DATE: 7/25/13
SHEET NO. 5-1	
DRAWING NO.: SATN22	REV.:

SUB-PARTS LIST			
ITEM	P/N	ORIGINAL DESCRIPTION	CUT
93	400099	WIRE,#2 SOLID COPPER,BARE,TINNED	144"



INTERIOR ELEVATION "D"  
MECHANICAL

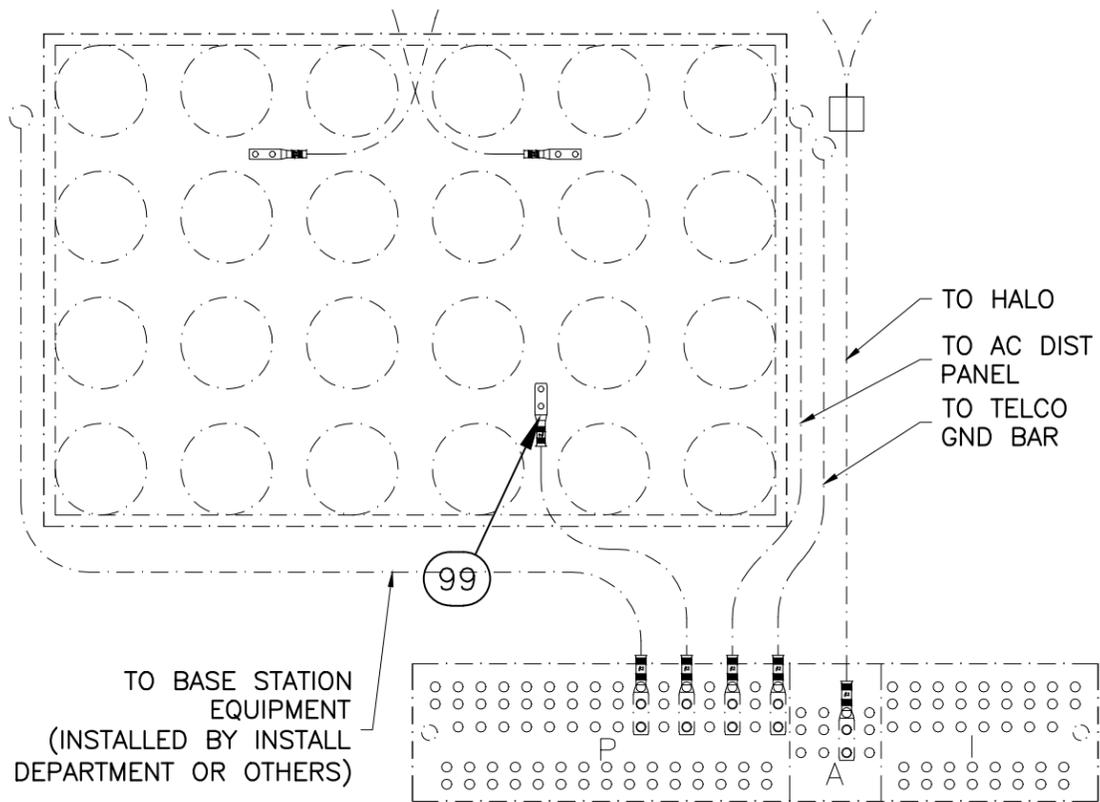
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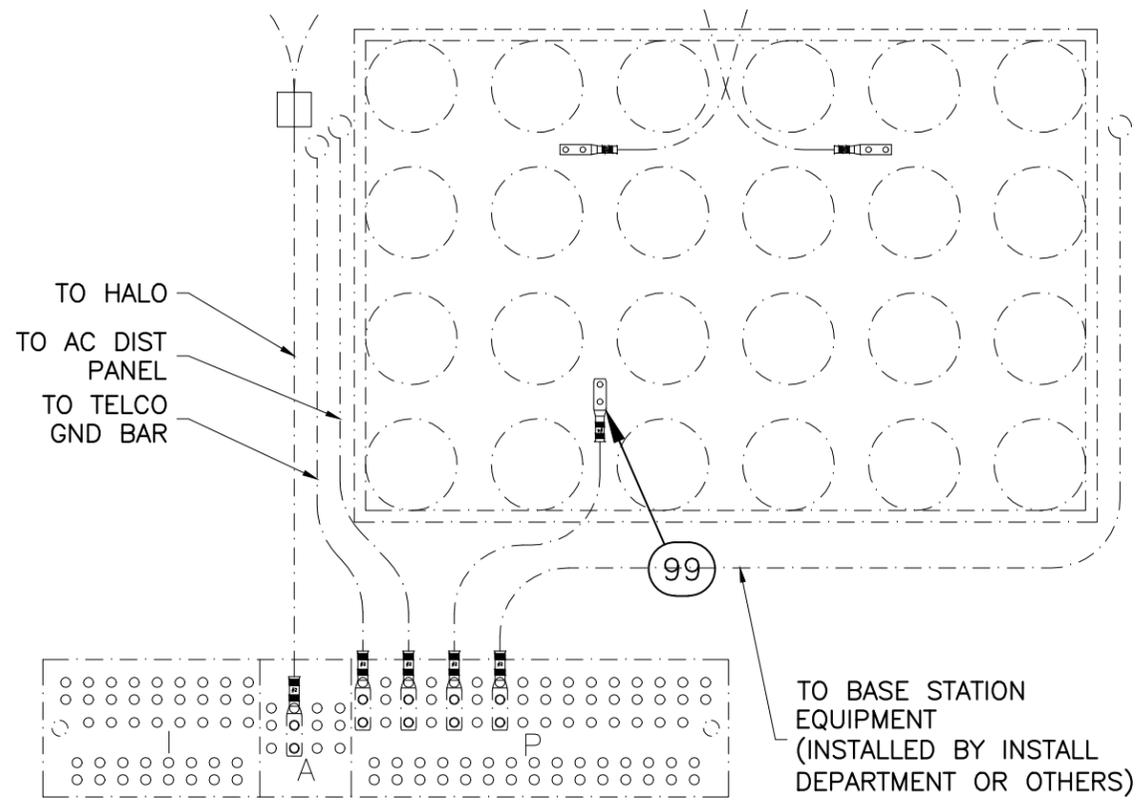
CUSTOMER:  
**AT&T WIRELESS SERVICES**

PROJECT:  
**11'-5" X 16'-0" CONCRETE SHELTER INTERIOR ELEVATION "D" (MECHANICAL)**

FILENAME: SATN22	
SCALE: 3/8" = 1'-0"	TOLERANCE:
DRWN. BY: J. REEVES	DATE: 7/25/13
CHK. BY: D. BROYLES	DATE: 7/25/13
ENG. BY:	DATE:
APP. BY: D. BRANNEN	DATE: 7/25/13
SHEET NO. 5-2	
DRAWING NO.: SATN22	REV.:



INTERIOR GROUND  
BAR DETAIL  
(WAVEGUIDE "D1")



INTERIOR GROUND  
BAR DETAIL  
(WAVEGUIDE "B1" & "D2")

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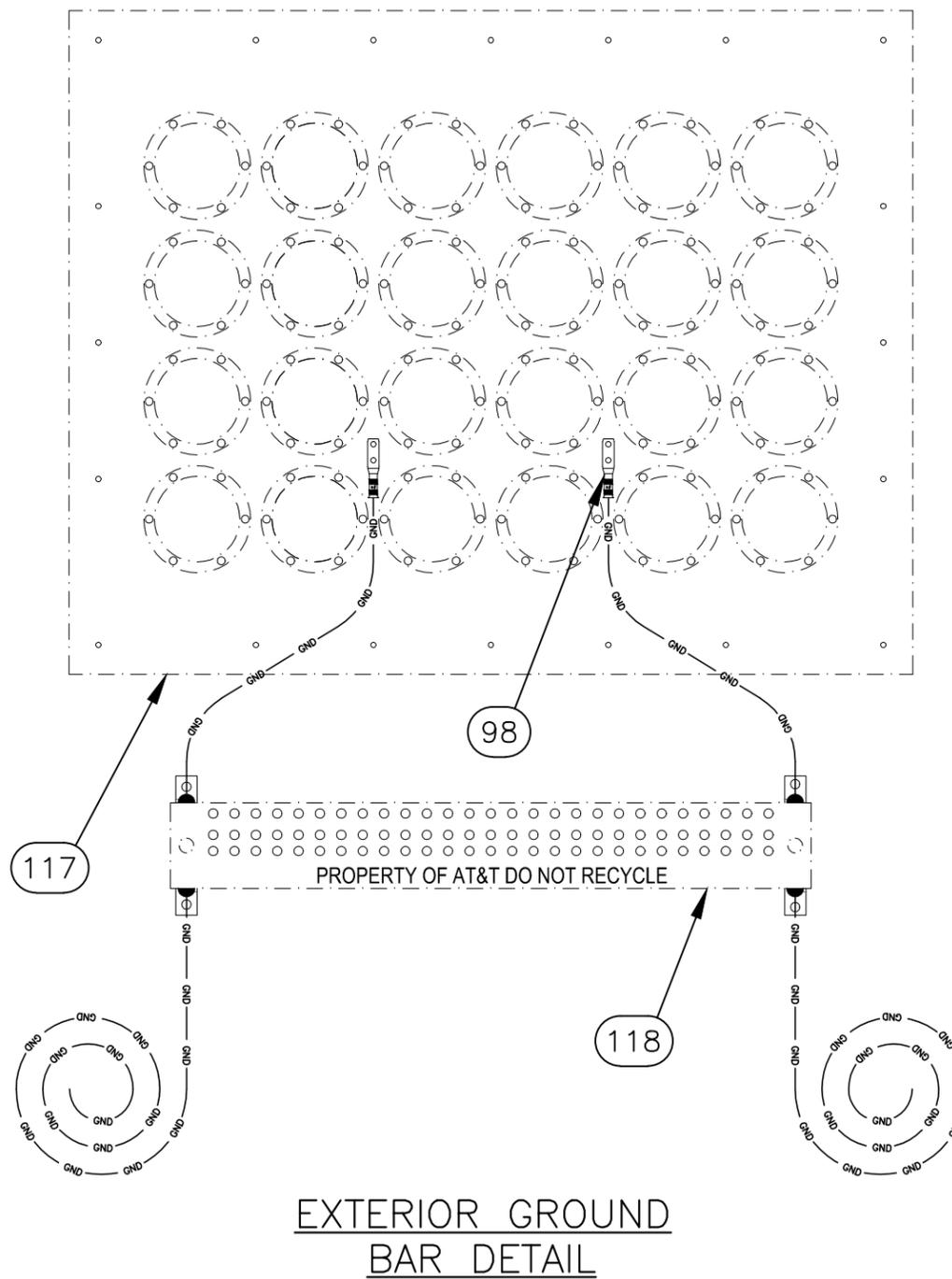
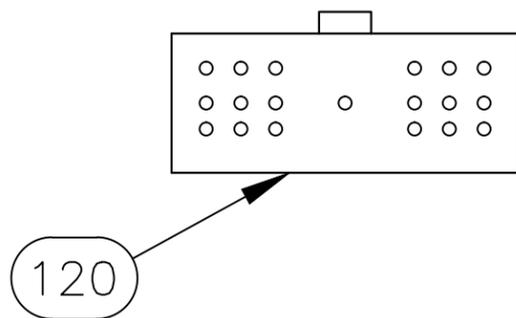
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CUSTOMER:  
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PROJECT:  
**11'-5" X 16'-0" CONCRETE SHELTER GROUND BAR DETAILS**

FILENAME: SATN22	
SCALE: 3/8" = 1'-0"	TOLERANCE:
DRWN. BY: J. REEVES	DATE: 7/25/13
CHK. BY: D. BROYLES	DATE: 7/25/13
ENG. BY:	DATE:
APP. BY: D. BRANNEN	DATE: 7/25/13
SHEET NO. 5-3	
DRAWING NO.: SATN22	REV.:

TELCO GROUND  
BAR DETAIL



EXTERIOR GROUND  
BAR DETAIL

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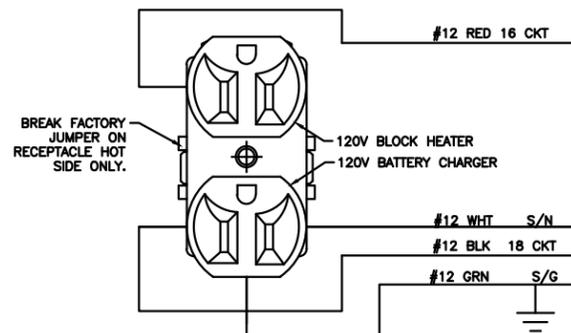
CUSTOMER:  
**AT&T WIRELESS  
 SERVICES**

PROJECT:  
**11'-5" X 16'-0"  
 CONCRETE SHELTER  
 TELCO/EXTERIOR  
 GROUND BAR DETAILS**

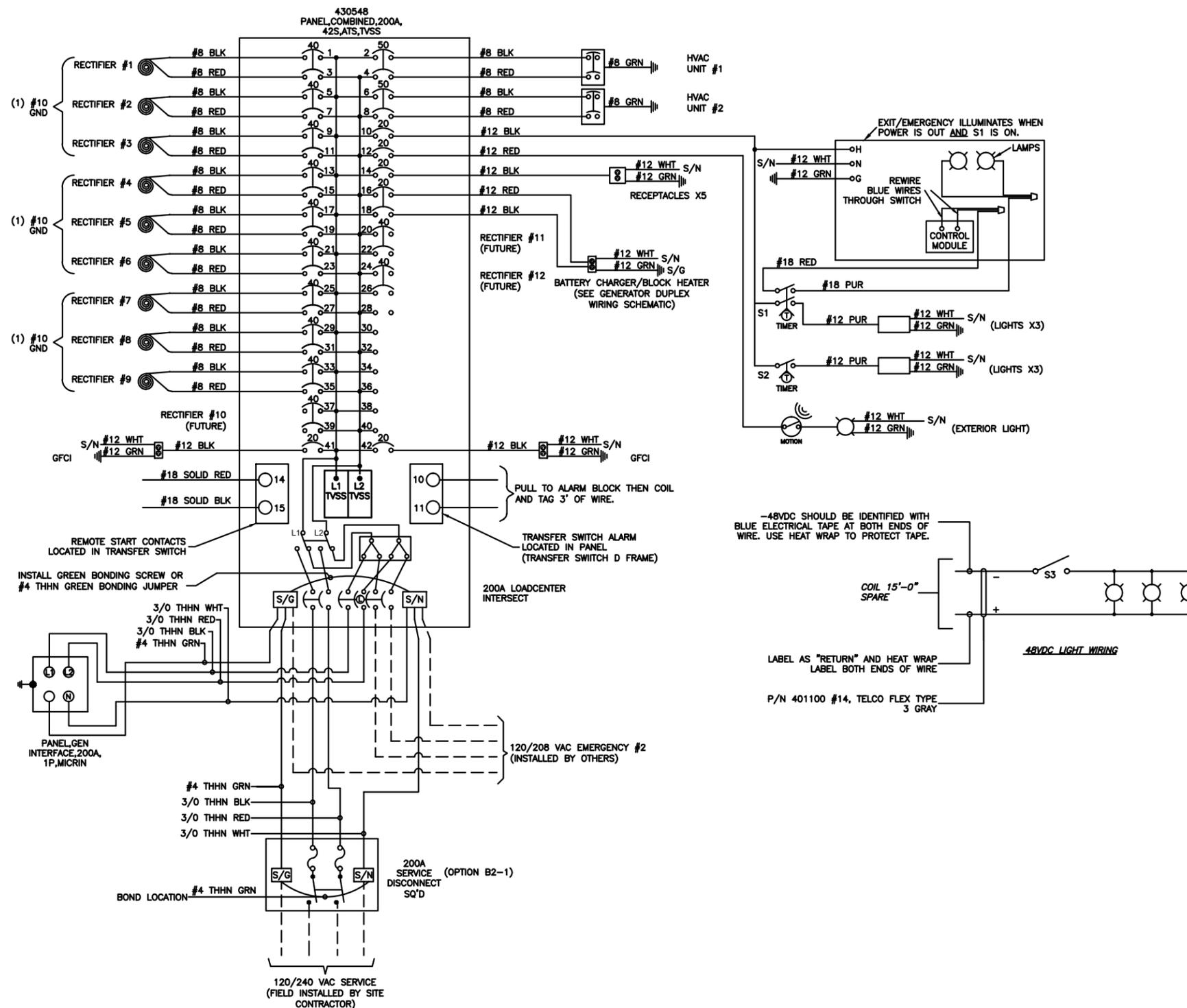
FILENAME: SATN22	
SCALE: 3/8" = 1'-0"	TOLERANCE:
DRWN. BY: J. REEVES	DATE: 7/25/13
CHK. BY: D. BROYLES	DATE: 7/25/13
ENG. BY:	DATE:
APP. BY: D. BRANNEN	DATE: 7/25/13
SHEET NO. 5-4	
DRAWING NO.: SATN22	REV.:

NOTES:

- DO NOT SHARE NEUTRALS UNLESS OTHERWISE SPECIFIED.
- WHEN AC & DC WIRING IS LOCATED IN THE SAME BOX, ENCLOSURE, OR WIREWAY, WIRES MUST BE LABELED WITH VOLTAGE TYPE.
- DC VOLTAGE IS NEGATIVE FEED, CHANGE CONNECTION POINTS AT DEVICES SO THAT BLACK WIRES ARE CONNECTED TO POSITIVE(+) TERMINALS AND RED WIRES ARE CONNECTED TO NEGATIVE(-) TERMINALS.
- ALL WIRES TO BE THHN TYPE RATED 90°C.



GENERATOR DUPLEX WIRING SCHEMATIC (INSIDE GENERATOR HOUSING)



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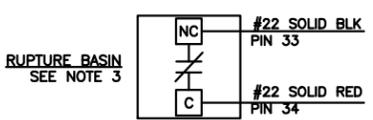
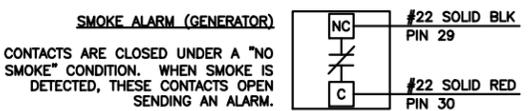
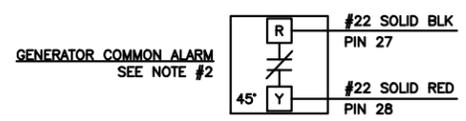
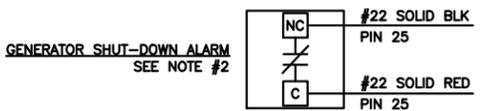
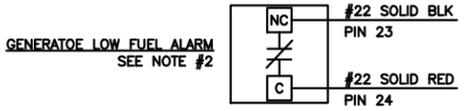
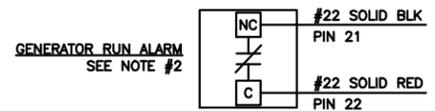
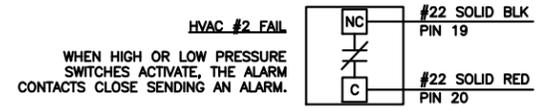
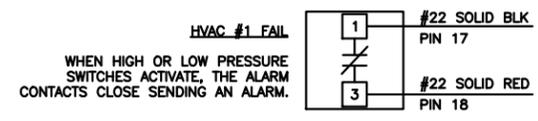
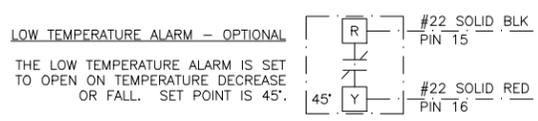
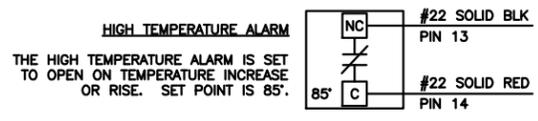
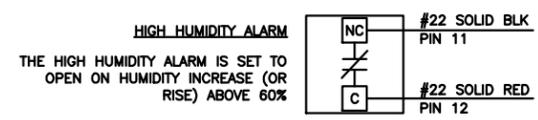
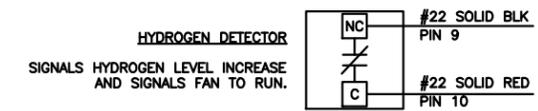
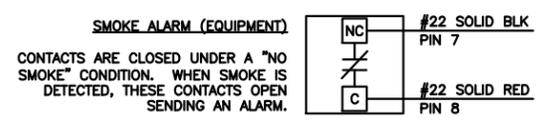
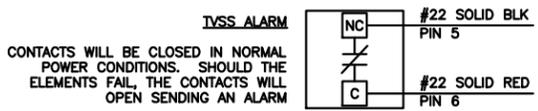
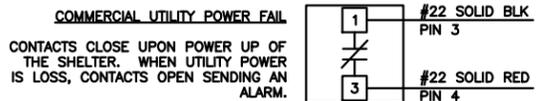
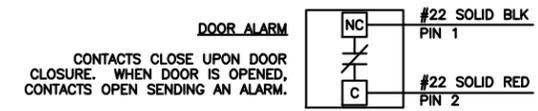
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CUSTOMER:  
**AT&T WIRELESS SERVICES**

PROJECT:  
**11'-5" X 16'-0" CONCRETE SHELTER ELECTRICAL SCHEMATIC**

FILENAME: SATN22	
SCALE: N.T.S.	TOLERANCE:
DRWN. BY: J. REEVES	DATE: 7/25/13
CHK. BY: D. BROYLES	DATE: 7/25/13
ENG. BY:	DATE:
APP. BY: D. BRANNEN	DATE: 7/25/13
SHEET NO. 6-0	
DRAWING NO.:	REV.:
SATN22	

ALARM BLOCK #1



PULL TO ALARM BLOCK THEN PUNCH DOWN AS NOTED:

NOTES:

1. DIAGRAM SHOWS WHERE TO TERMINATE IF ALARM IS REQUIRED IN SHELTER. NOT ALL ALARMS MAY BE REQUIRED.
2. GENERATOR ALARMS SHALL ORIGINATE DIRECTLY FROM GENSET IF A GENERATOR ROOM IS SUPPLIED WITHIN THE SHELTER, OR FROM THE MICRIN INTERFACE PANEL IF AN EQUIPMENT ONLY SHELTER.
3. ALARMS REQUIRED THAT ARE NOT DISPLAYED ON THIS DETAIL SHALL BE TAGGED WITH ORIGIN AND COILED 2FT FOR CUSTOMER CONNECTION.
4. STANDARD SHELTER EQUIPMENT REQUIRING DC POWDER (SUCH AS - BUT NOT LIMITED TO - SMOKE DETECTORS, HYDROGEN DETECTORS, EMERGENCY DC LIGHTING, ETC.) WILL BE INSTALLED BY SHELTER VENDOR WITH DC WIRING LABELED AND COILED (NEAR RECTIFIER DROPS) FOR FUTURE TERMINATION INTO DC PLANTS.
5. MICRIN/COMMTECH STANDARD MOBILE GENERATOR CAM/LOCK ASSEMBLY IS EQUIPPED WITH ALARM/CONTROL CONNECTOR PRE-WIRED WITH 25' (5 PAIR CABLE) #24 FOR TERMINATION AT ALARM CONNECTION BLOCKS AND ALSO PRE-WIRED WITH 20' #16 (SINGLE PAIR) FOR TERMINATION TO ATS AUTO START/STOP TERMINALS.
6. EQUIPMENT ROOM SMOKE DETECTOR UPON ALARM MUST DISABLE HVAC UNITS & DISABLE OPTIONAL DC VENTILATION FAN SYSTEM IF APPLICABLE. GENERATOR ROOM SMOKE DETECTOR UPON ALARM MUST DISABLE GENERATOR & ANY GENERATOR ROOM FAN SYSTEMS.

PULL TO ALARM BLOCK THEN PUNCH DOWN AS NOTED:

REVIEW REFERENCE DRAWING 108-136.  
ALL WIRING WILL GO TO ALARM BLOCK #1 ONLY.

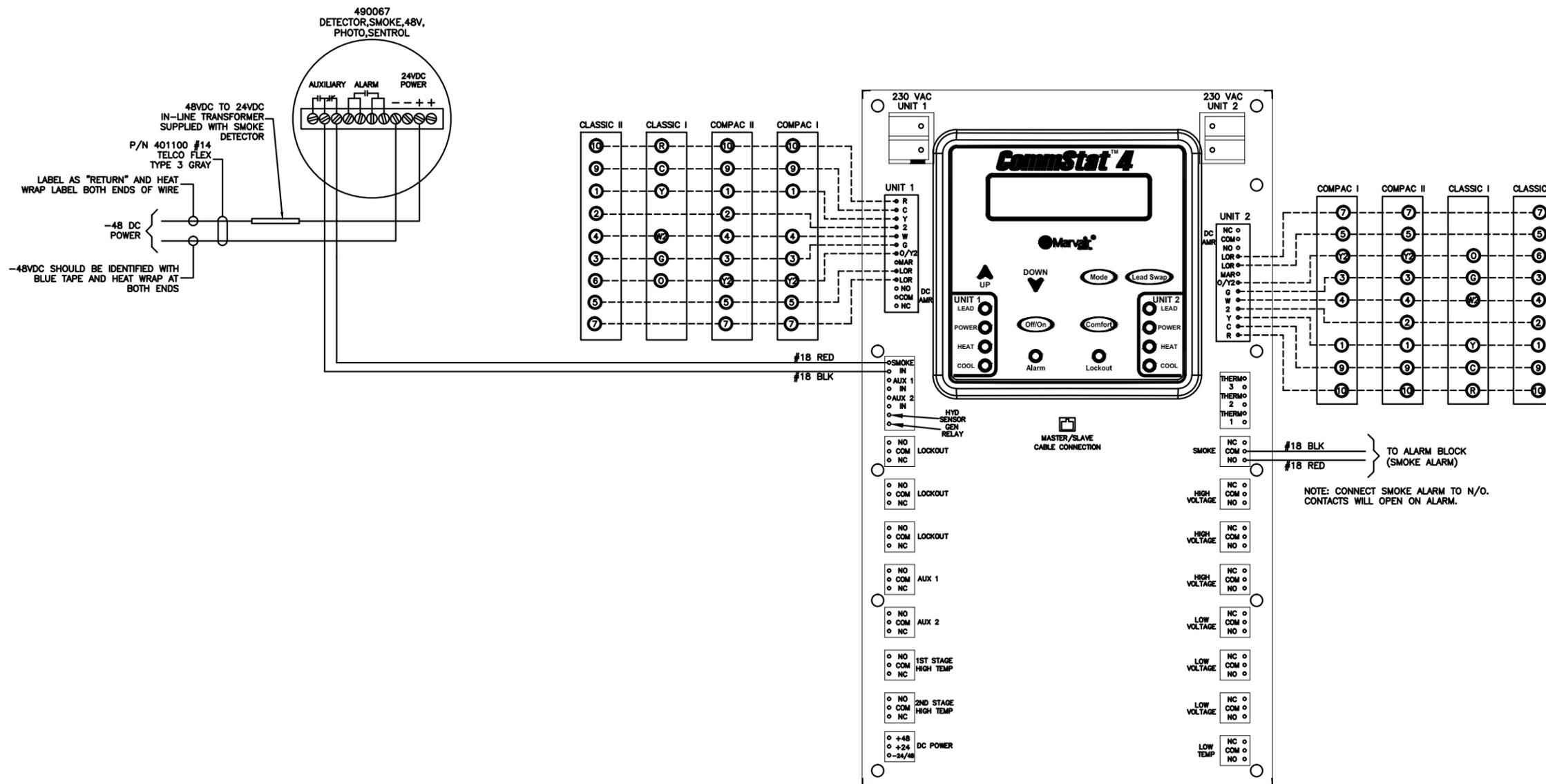
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CUSTOMER:  
**AT&T WIRELESS SERVICES**

PROJECT:  
**11'-5" X 16'-0" CONCRETE SHELTER LOW VOLTAGE SCHEMATIC**

FILENAME: SATN22	
SCALE: N.T.S.	TOLERANCE:
DRWN. BY: J. REEVES	DATE: 7/25/13
CHK. BY: D. BROYLES	DATE: 7/25/13
ENG. BY:	DATE:
APP. BY: D. BRANNEN	DATE: 7/25/13
SHEET NO. 6-1	
DRAWING NO.: SATN22	REV.:



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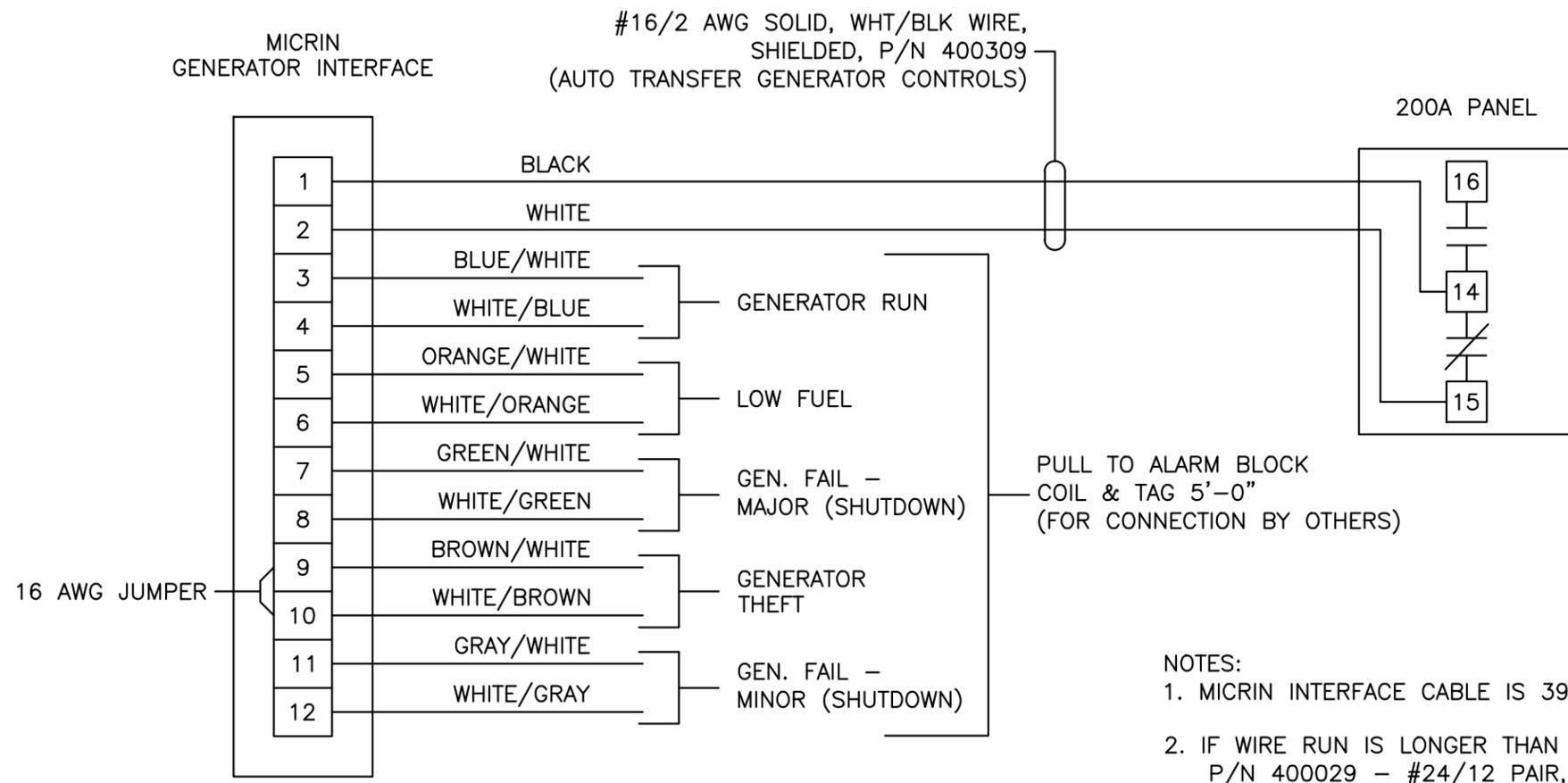
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CUSTOMER:  
**AT&T WIRELESS SERVICES**

PROJECT:  
**11'-5" X 16'-0"  
CONCRETE SHELTER  
COMMSTAT 4 &  
48VDC SMOKE WIRING**

FILENAME: SATN22	
SCALE: N.T.S.	TOLERANCE:
DRWN. BY: J. REEVES	DATE: 7/25/13
CHK. BY: D. BROYLES	DATE: 7/25/13
ENG. BY:	DATE:
APP. BY: D. BRANNEN	DATE: 7/25/13
SHEET NO. 6-2	
DRAWING NO.: SATN22	REV.:



- NOTES:
1. MICRIN INTERFACE CABLE IS 39'-0" LONG.
  2. IF WIRE RUN IS LONGER THAN 39'-0" USE P/N 400029 - #24/12 PAIR, CAT3, SOLID WIRE.

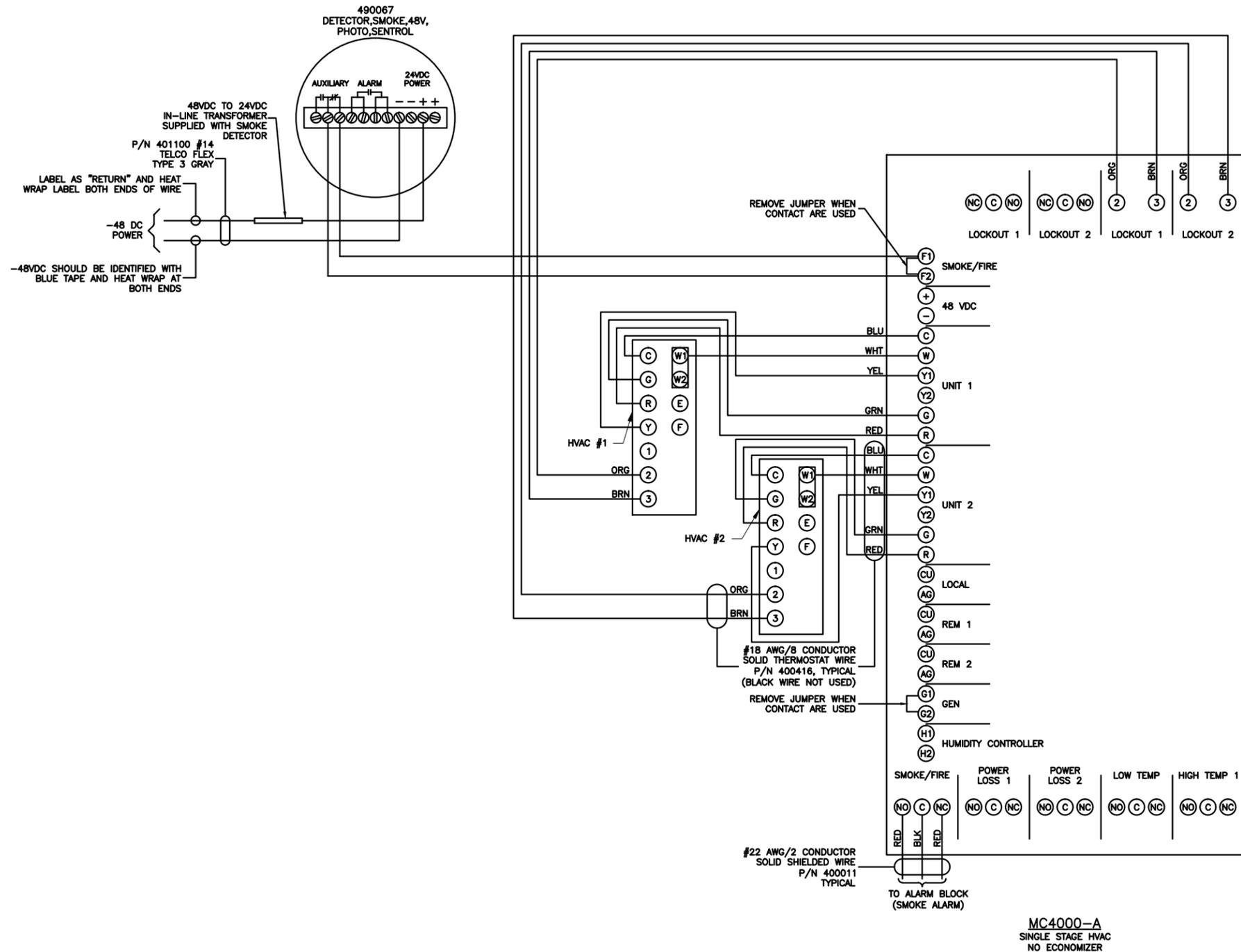
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CUSTOMER:  
**AT&T WIRELESS SERVICES**

PROJECT:  
**11'-5" X 16'-0" CONCRETE SHELTER LOW VOLTAGE WIRING GEN. INTERFACE**

FILENAME: SATN22	
SCALE: N.T.S.	TOLERANCE:
DRWN. BY: J. REEVES	DATE: 7/25/13
CHK. BY: D. BROYLES	DATE: 7/25/13
ENG. BY:	DATE:
APP. BY: D. BRANNEN	DATE: 7/25/13
SHEET NO. 6-3	
DRAWING NO.: SATN22	REV.:



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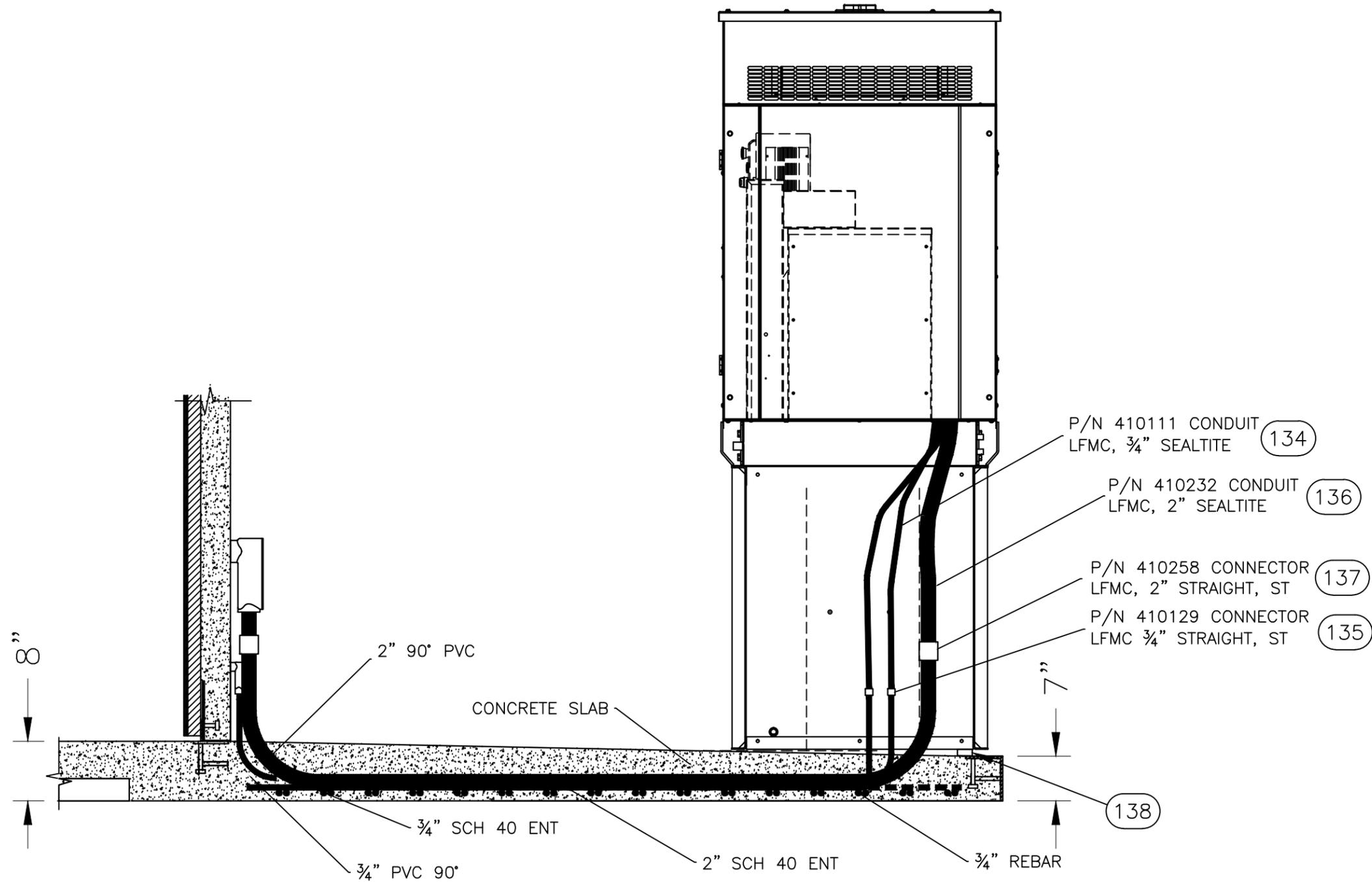
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CUSTOMER:  
**AT&T WIRELESS SERVICES**

PROJECT:  
**11'-5" X 16'-0" CONCRETE SHELTER MC4000-A & 48VDC SMOKE WIRING**

FILENAME: SATN22	
SCALE: N.T.S.	TOLERANCE:
DRWN. BY: J. REEVES	DATE: 7/25/13
CHK. BY: D. BROYLES	DATE: 7/25/13
ENG. BY:	DATE:
APP. BY: D. BRANNEN	DATE: 7/25/13
SHEET NO. 6-4	
DRAWING NO.: SATN22	REV.:



- NOTE:
1. CONCRETE SLAB SHOULD BE SOLID IN EMBEDDED CONDUIT REGION. (NO FORM)
  2. MESH REINFORCEMENT ON TOP OF CONDUIT.
  3. TIE CONDUIT TO REBAR.

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CUSTOMER:  
**AT&T WIRELESS SERVICES**

PROJECT:  
**11'-5" X 16'-0" CONCRETE SHELTER  
 DETAIL  
 DRAWING**

FILENAME: SATN22	
SCALE: N.T.S.	TOLERANCE:
DRWN. BY: J. REEVES	DATE: 7/25/13
CHK. BY: D. BROYLES	DATE: 7/25/13
ENG. BY:	DATE:
APP. BY: D. BRANNEN	DATE: 7/25/13
SHEET NO. 7-0	
DRAWING NO.: SATN22	REV.: