SITE PLAN REVIEW COMMITTEE

WEDNESDAY, AUGUST 6, 2025
Hybrid Meeting, Nauset Room, Orleans Town Hall @ 10:00 AM

Or Join via ZOOM:
https://us02web.zoom.us/j/89581394023
or Telephone: +1 646 558 8656
Webinar ID: 895 8139 4023

FORMAL REVIEW (Continued):

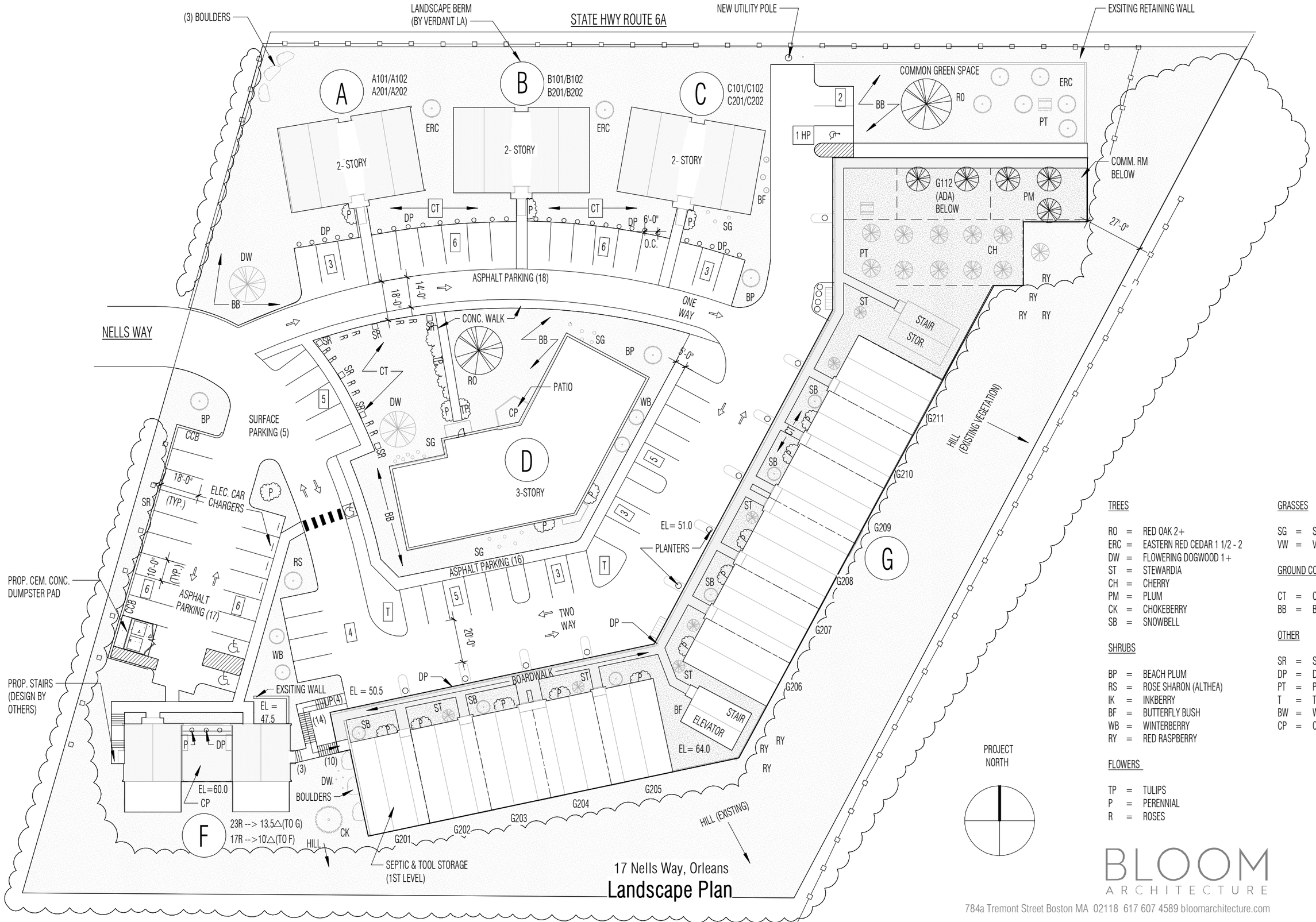
Applicant: Orleans Plaza LLC (Chris DeSisto)
Location: 17 Nell's Way
Description: Construct 29 apartments and 13,000 s.f. commercial rehab of vacant mall structure.

INFORMAL REVIEW:

Applicant: Luminous Solar LLC
Location: 1 Commerce Drive
Description: Design, provision and installation of a 522-module canopy-mounted, grid interconnected solar photovoltaic array

APPROVAL OF MINUTES

- Site Plan Review Committee minutes for July 16, 2025



17 Nells Way, Orleans

Landscape Plan

TREES

RO = RED OAK 2+
ERC = EASTERN RED CEDAR 1 1/2 - 2
DW = FLOWERING DOGWOOD 1+
ST = STEWARDIA
CH = CHERRY
PM = PLUM
CK = CHOKEBERRY
SB = SNOWBELL

SHRUBS

BP = BEACH PLUM
RS = ROSE SHARON (ALTHEA)
IK = INKBERRY
BF = BUTTERFLY BUSH
WB = WINTERBERRY
RY = RED RASPBERRY

FLOWERS

TP = TULIPS
P = PERENNIAL
R = ROSES

GRASSES

SG = SWITCH GRASS
VW = VIRGINIA WILD RYE

GROUND COVER

CT = CREEPING THYME
BB = BEAR BERRY

OTHER

SR = SPLIT RAIL FENCE
DP = DOCK PILING 6' O.C.
PT = PICNIC TABLE
T = TRANSFORMER
BW = WOOD BOARD WALK
CP = CONCRETE PATIO

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1.0

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17 Nells Way, Orleans

G-GROUND FLOOR PLAN

1" = 40'-0"

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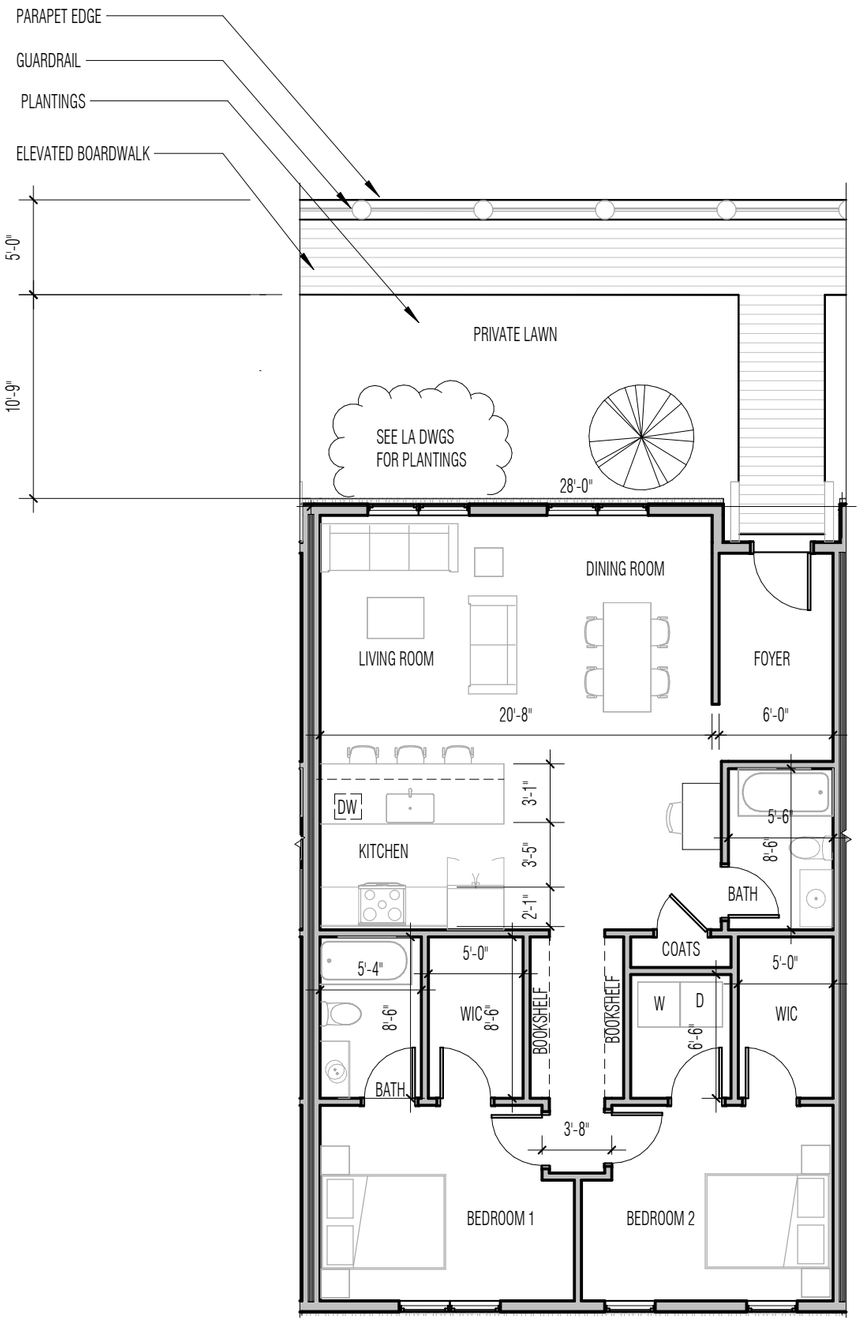
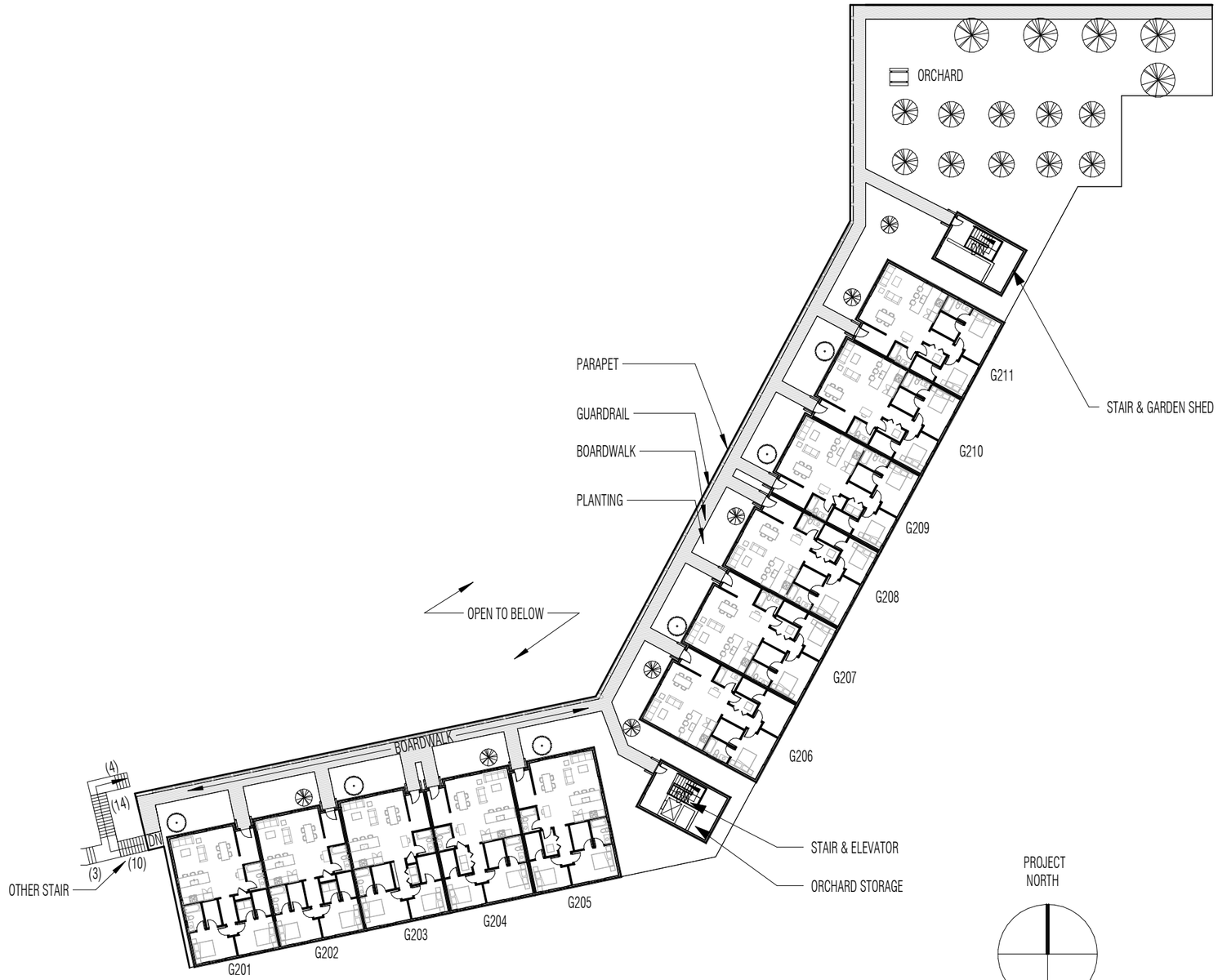
07/25/25



2 ENLARGED UNIT PLAN-G
1/8" = 1'-0"



1 G-FIRST FLOOR
1" = 40'-0"

17 Nells Way, Orleans

G-FIRST FLOOR PLAN

As indicated

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HANCOCK
ASSOCIATES
Surveyors | Engineers | Scientists

Orleans Department of Public Works
40 Giddiah Hill Road
Orleans, MA 02653

July 29, 2025

Attn.: Mr. Ron Trudeau, Operations Manager

Re: Orleans Plaza – 17 Nell's Way
Stormwater Management Compliance for Revised Site Design

Dear Mr. Trudeau:

As requested during the last Site Plan Review Committee meeting regarding the proposed revisions to the redevelopment plans for 17 Nell's Way, enclosed herewith please find updated drainage calculations for the 25-year storm event under existing and post-development site conditions.

The attached HydroCAD drainage calculations along with the proposed stormwater management system depicted on the Site Grading demonstrate that the project will contain the 25-year storm on site for the post-development conditions as required by the Town of Orleans. Per the calculations a minimum of 120 Cultec R-330XLHD infiltration chambers and associated crushed stone are required to contain the 25-year storm. The revised site design calls for 120 Cultec R-330XLHD infiltration chambers, satisfying this criteria.

The proposed grading is also designed to contain runoff on site, collected by deep sump catch basins with hooded outlet pipes, and area drains which direct stormwater flows to the various subsurface infiltration systems. Roof drains will also direct runoff to the infiltration systems.

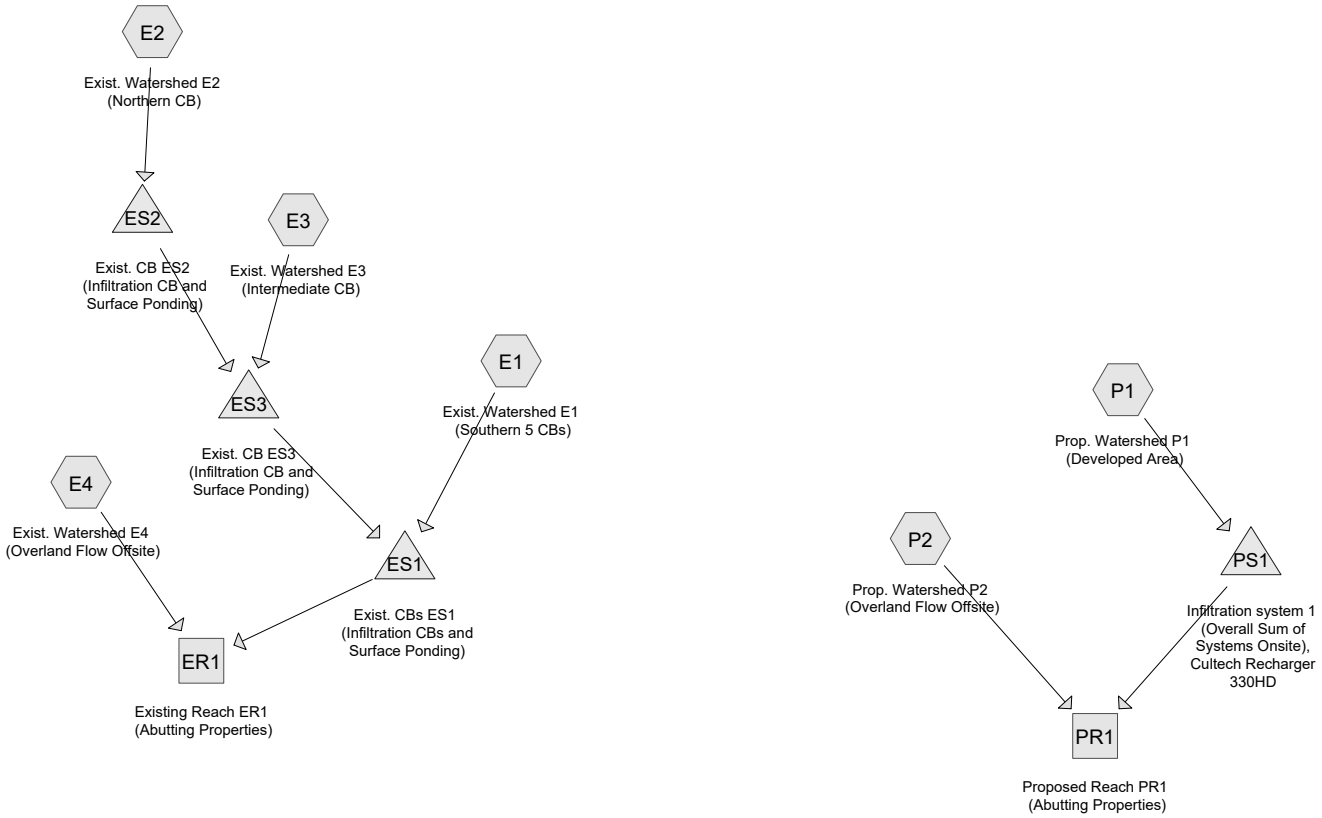
Soil testing was performed by H. W. Moore Associates in December of 2022: test pits excavated to depths of 11 to 14 feet revealed coarse to medium sand and no groundwater was observed in any of the pits. Accordingly, the project site is well suited for the proposed subsurface stormwater infiltration systems.

Thank you for your comments at the last meeting, please do not hesitate to call me should you have any questions or require additional information.

Very truly yours,
Hancock Associates

David T. White, P.E.
Project Engineer

cc: Chris DeSisto, Orleans Plaza LLC
Derek Bloom, Bloom Architecture



Subcat Reach Pond Link

Routing Diagram for 25887-Orleans-HydroCAD 2025-07-29
Prepared by {enter your company name here}, Printed 7/29/2025

Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment E1: Exist. Watershed E1 Runoff Area=3.078 ac 53.80% Impervious Runoff Depth>2.30"
Flow Length=343' Tc=9.3 min CN=68 Runoff=7.29 cfs 0.589 af

Subcatchment E2: Exist. Watershed E2 Runoff Area=0.473 ac 34.04% Impervious Runoff Depth>1.35"
Flow Length=319' Tc=12.4 min CN=56 Runoff=0.53 cfs 0.053 af

Subcatchment E3: Exist. Watershed E3 Runoff Area=0.103 ac 86.41% Impervious Runoff Depth>4.43"
Flow Length=126' Tc=8.5 min CN=90 Runoff=0.47 cfs 0.038 af

Subcatchment E4: Exist. Watershed E4 Runoff Area=0.492 ac 6.50% Impervious Runoff Depth>0.29"
Flow Length=180' Tc=7.6 min CN=38 Runoff=0.04 cfs 0.012 af

Subcatchment P1: Prop. Watershed P1 Runoff Area=3.716 ac 52.56% Impervious Runoff Depth>2.30"
Flow Length=434' Tc=9.3 min CN=68 Runoff=8.80 cfs 0.712 af

Subcatchment P2: Prop. Watershed P2 Runoff Area=0.398 ac 1.01% Impervious Runoff Depth>0.14"
Flow Length=180' Tc=7.6 min CN=34 Runoff=0.01 cfs 0.005 af

Reach ER1: Existing Reach ER1 (Abutting Properties) Inflow=7.50 cfs 0.628 af
Outflow=7.50 cfs 0.628 af

Reach PR1: Proposed Reach PR1 (Abutting Properties) Inflow=0.01 cfs 0.005 af
Outflow=0.01 cfs 0.005 af

Pond ES1: Exist. CBs ES1 (Infiltration CBs Peak Elev=45.05' Storage=1,494 cf Inflow=7.75 cfs 0.647 af
Discarded=0.01 cfs 0.014 af Primary=7.50 cfs 0.616 af Outflow=7.52 cfs 0.630 af

Pond ES2: Exist. CB ES2 (Infiltration CB and Peak Elev=49.51' Storage=1,147 cf Inflow=0.53 cfs 0.053 af
Discarded=0.00 cfs 0.002 af Primary=0.07 cfs 0.026 af Outflow=0.07 cfs 0.028 af

Pond ES3: Exist. CB ES3 (Infiltration CB and Peak Elev=48.47' Storage=145 cf Inflow=0.47 cfs 0.064 af
Discarded=0.00 cfs 0.004 af Primary=0.46 cfs 0.057 af Outflow=0.46 cfs 0.061 af

Pond PS1: Infiltration system 1 (Overall Sum Peak Elev=3.94' Storage=0.251 af Inflow=8.80 cfs 0.712 af
Outflow=1.16 cfs 0.712 af

Summary for Subcatchment E1: Exist. Watershed E1 (Southern 5 CBs)

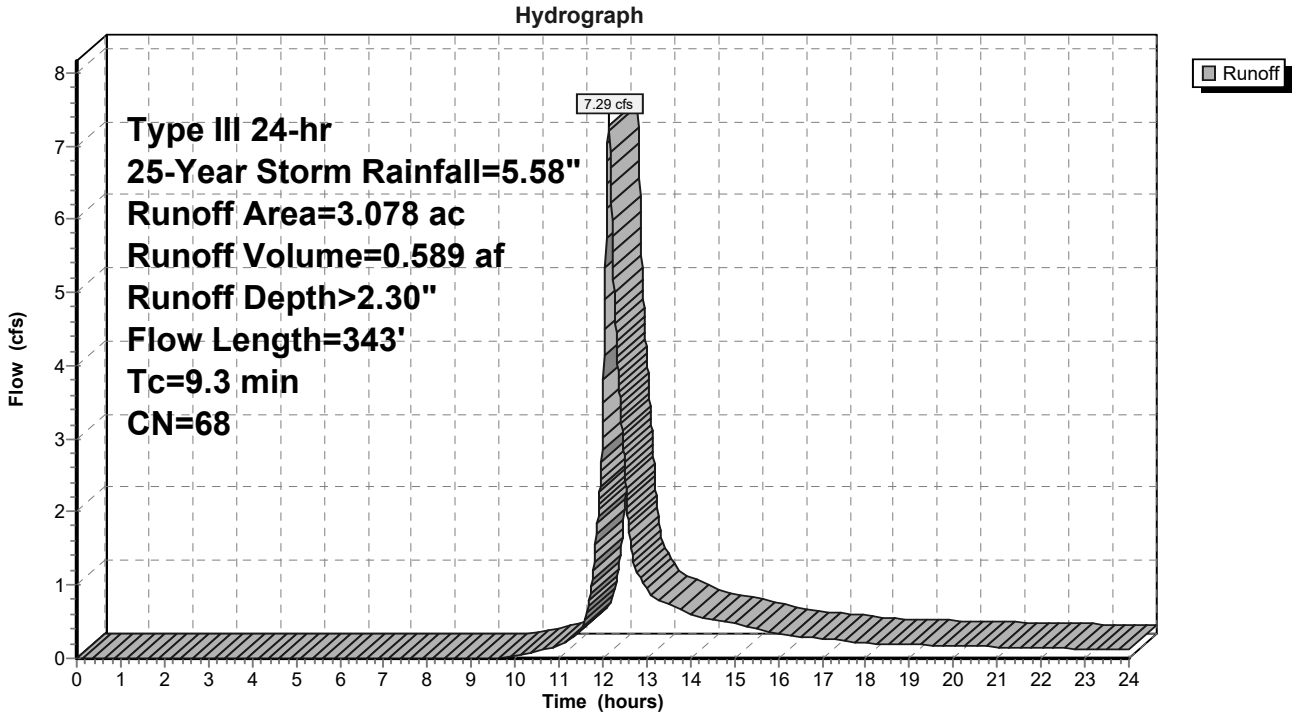
Runoff = 7.29 cfs @ 12.14 hrs, Volume= 0.589 af, Depth> 2.30"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Storm Rainfall=5.58"

	Area (ac)	CN	Description
	1.586	98	Paved parking, HSG A
*	0.070	98	Sidewalks, HSG A
	0.573	39	>75% Grass cover, Good, HSG A
	0.849	30	Woods, Good, HSG A
	3.078	68	Weighted Average
	1.422		46.20% Pervious Area
	1.656		53.80% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.1	90	0.2660	0.21		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
0.8	10	0.1000	0.20		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.10"
0.3	31	0.0650	1.78		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.9	165	0.0250	3.21		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.2	47	0.0260	3.27		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
9.3	343	Total			

Subcatchment E1: Exist. Watershed E1 (Southern 5 CBs)



Summary for Subcatchment E2: Exist. Watershed E2 (Northern CB)

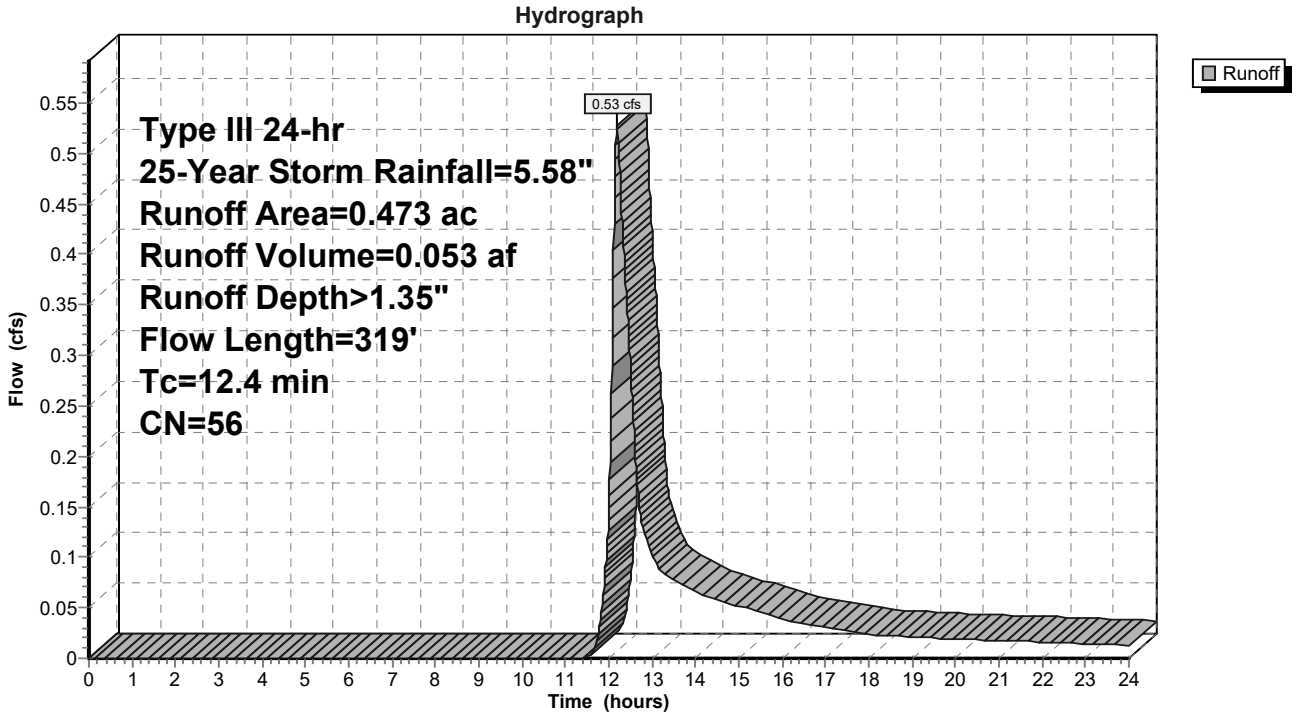
Runoff = 0.53 cfs @ 12.19 hrs, Volume= 0.053 af, Depth> 1.35"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Storm Rainfall=5.58"

Area (ac)	CN	Description
0.141	98	Paved parking, HSG A
0.020	98	Paved parking, HSG A
0.126	39	>75% Grass cover, Good, HSG A
0.186	30	Woods, Good, HSG A
0.473	56	Weighted Average
0.312		65.96% Pervious Area
0.161		34.04% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	49	0.1430	0.15		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
3.8	49	0.3888	0.22		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
2.7	165	0.0210	1.01		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.3	56	0.0250	3.21		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
12.4	319	Total			

Subcatchment E2: Exist. Watershed E2 (Northern CB)



Summary for Subcatchment E3: Exist. Watershed E3 (Intermediate CB)

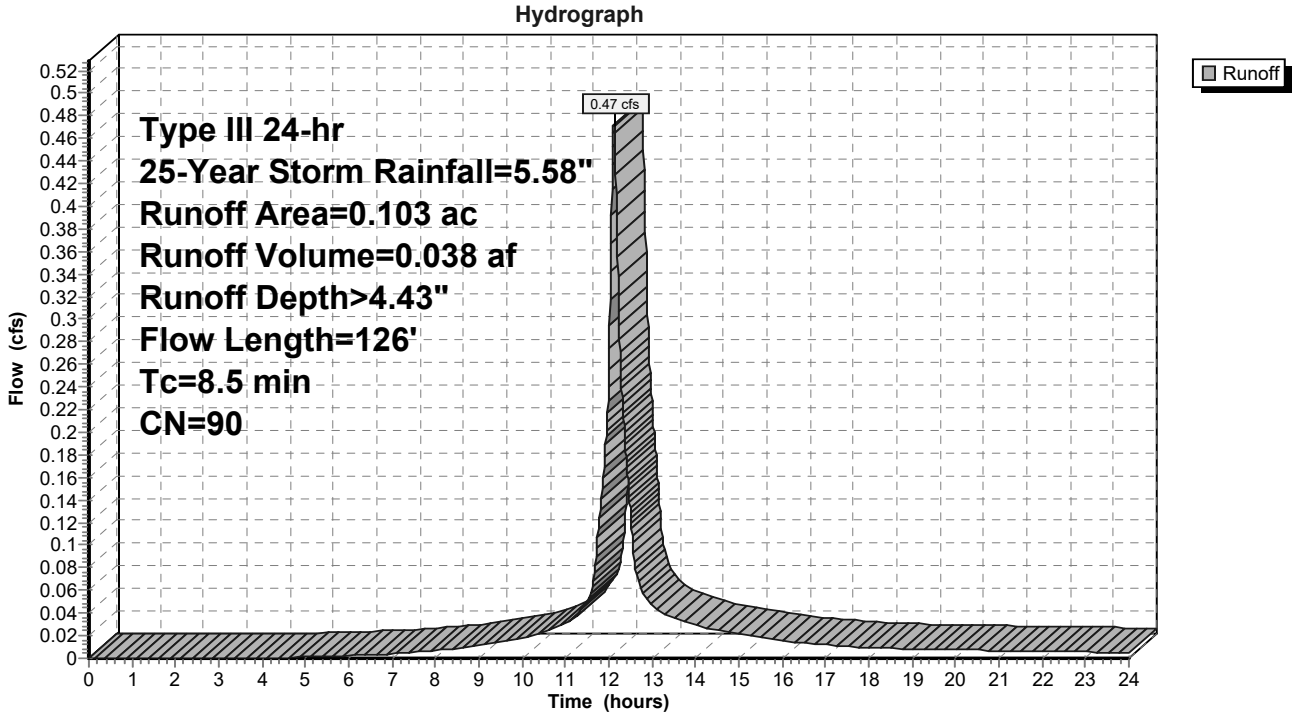
Runoff = 0.47 cfs @ 12.12 hrs, Volume= 0.038 af, Depth> 4.43"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Storm Rainfall=5.58"

Area (ac)	CN	Description
0.083	98	Paved parking, HSG A
0.006	98	Paved parking, HSG A
0.014	39	>75% Grass cover, Good, HSG A
0.103	90	Weighted Average
0.014		13.59% Pervious Area
0.089		86.41% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.1	49	0.0080	0.10		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.10"
0.4	77	0.0300	3.52		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
8.5	126	Total			

Subcatchment E3: Exist. Watershed E3 (Intermediate CB)



Summary for Subcatchment E4: Exist. Watershed E4 (Overland Flow Offsite)

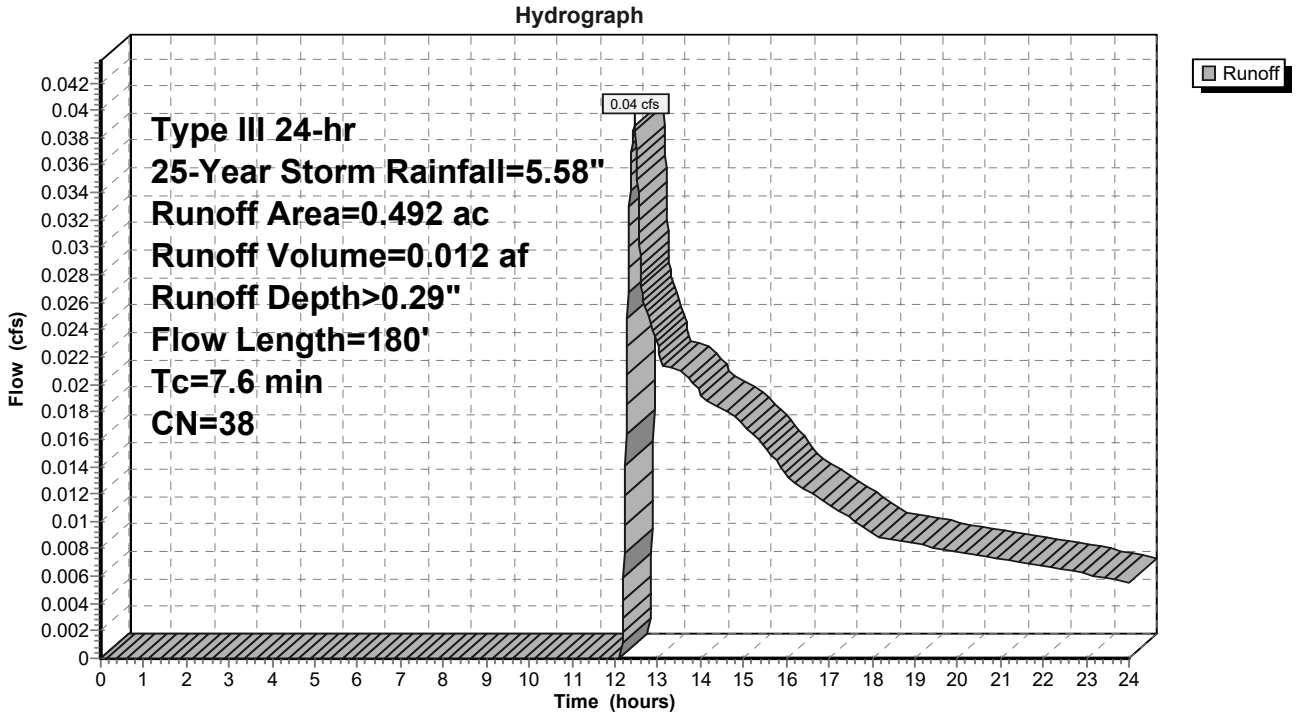
Runoff = 0.04 cfs @ 12.44 hrs, Volume= 0.012 af, Depth> 0.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Storm Rainfall=5.58"

Area (ac)	CN	Description
0.032	98	Paved parking, HSG A
0.190	39	>75% Grass cover, Good, HSG A
0.270	30	Woods, Good, HSG A
0.492	38	Weighted Average
0.460		93.50% Pervious Area
0.032		6.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.2	50	0.3140	0.20		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
2.4	17	0.1470	0.12		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
0.7	65	0.0540	1.63		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.1	22	0.3640	4.22		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.2	26	0.0960	2.17		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
7.6	180	Total			

Subcatchment E4: Exist. Watershed E4 (Overland Flow Offsite)



Summary for Subcatchment P1: Prop. Watershed P1 (Developed Area)

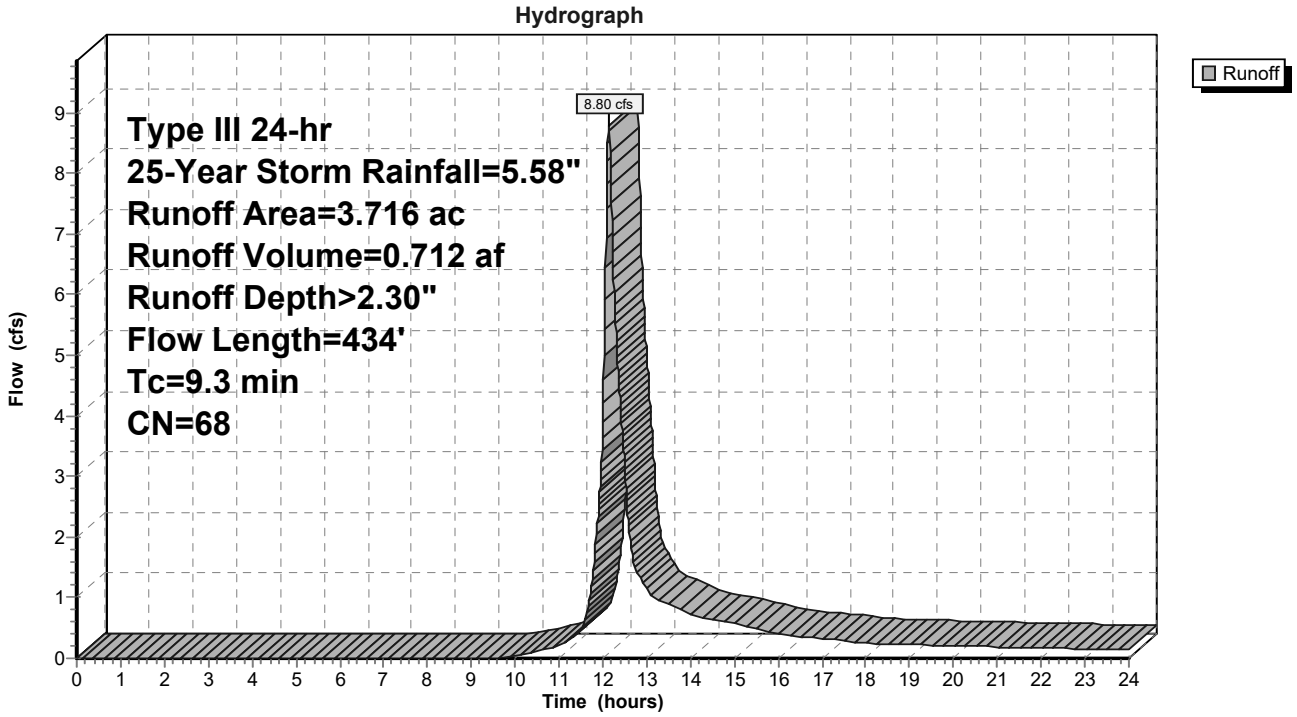
Runoff = 8.80 cfs @ 12.14 hrs, Volume= 0.712 af, Depth> 2.30"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Storm Rainfall=5.58"

	Area (ac)	CN	Description
*	1.953	98	Impervious
	0.974	39	>75% Grass cover, Good, HSG A
	0.789	30	Woods, Good, HSG A
	3.716	68	Weighted Average
	1.763		47.44% Pervious Area
	1.953		52.56% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.1	90	0.2660	0.21		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
0.8	10	0.1000	0.20		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.10"
0.3	31	0.0650	1.78		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.1	20	0.0650	5.18		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.2	27	0.0200	2.87		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.8	256	0.0100	5.36	4.21	**Pipe Channel, RCP_Round 12"** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.011
9.3	434	Total			

Subcatchment P1: Prop. Watershed P1 (Developed Area)



Summary for Subcatchment P2: Prop. Watershed P2 (Overland Flow Offsite)

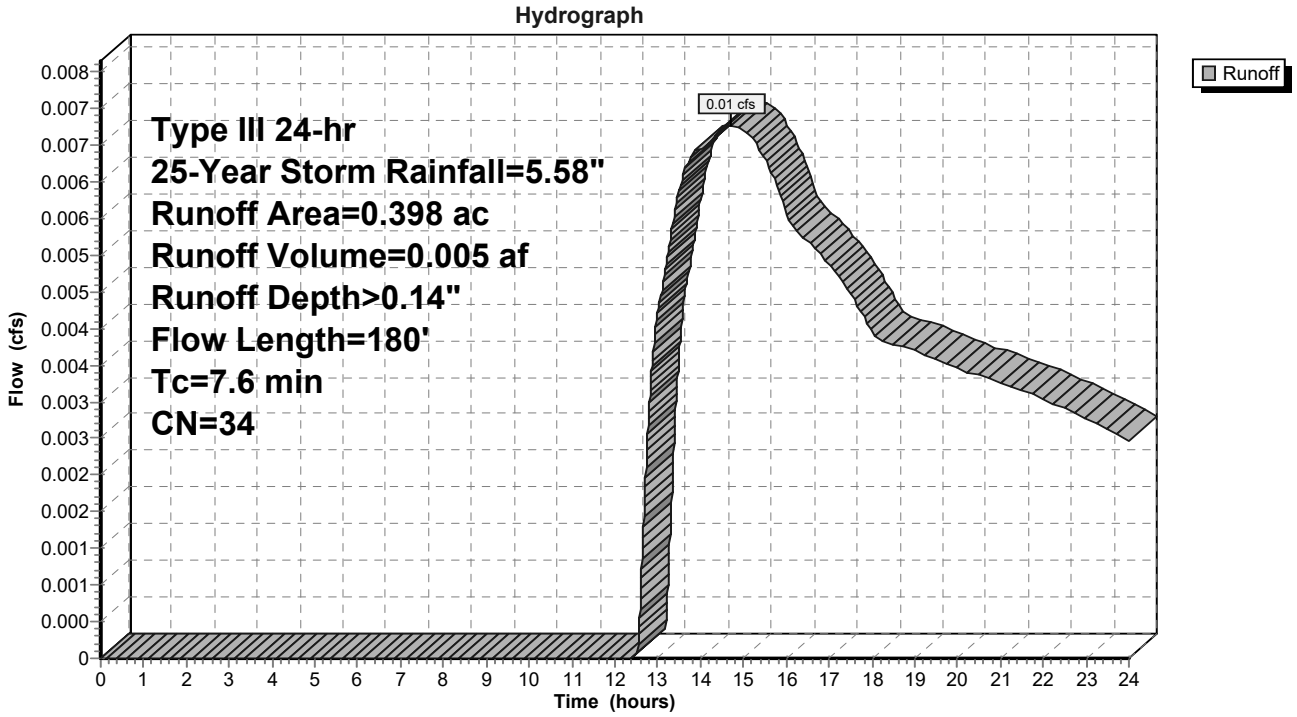
Runoff = 0.01 cfs @ 14.72 hrs, Volume= 0.005 af, Depth> 0.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Storm Rainfall=5.58"

Area (ac)	CN	Description
0.004	98	Paved parking, HSG A
0.127	39	>75% Grass cover, Good, HSG A
0.267	30	Woods, Good, HSG A
0.398	34	Weighted Average
0.394		98.99% Pervious Area
0.004		1.01% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.2	50	0.3140	0.20		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
2.4	17	0.1470	0.12		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
0.7	65	0.0540	1.63		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.1	22	0.3640	4.22		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
0.2	26	0.0960	2.17		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
7.6	180	Total			

Subcatchment P2: Prop. Watershed P2 (Overland Flow Offsite)

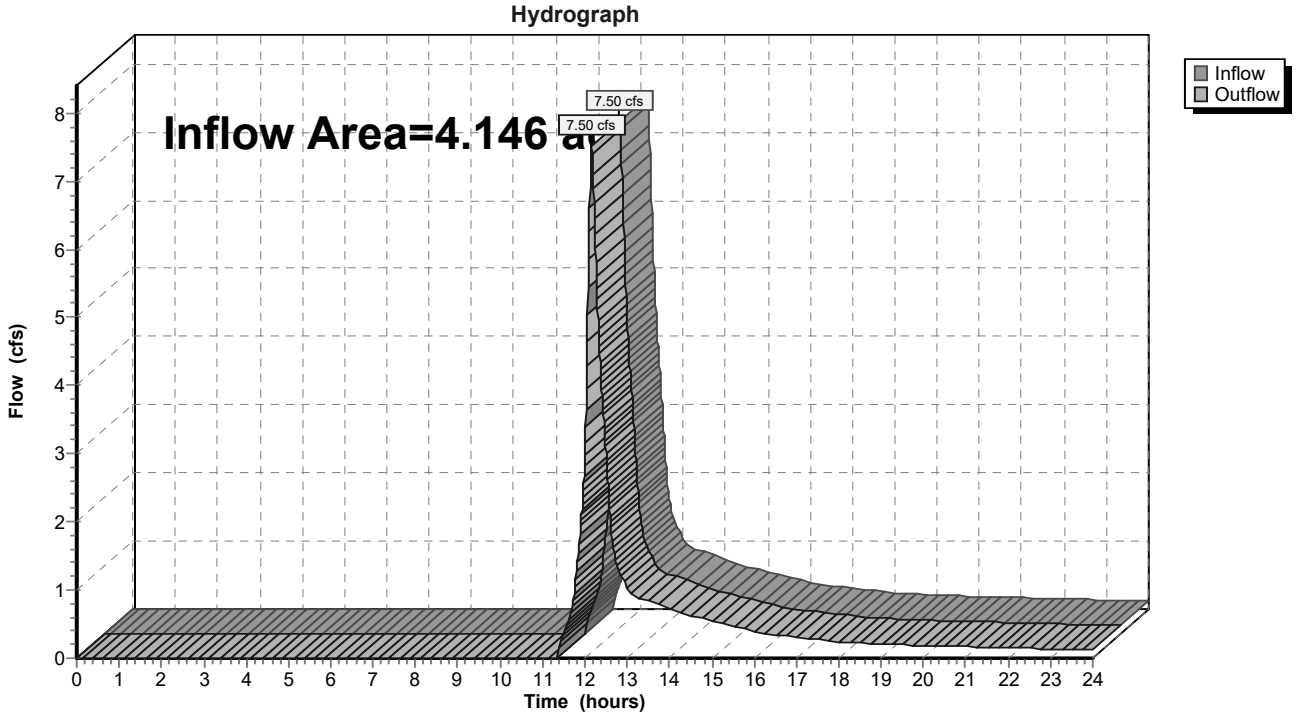


Summary for Reach ER1: Existing Reach ER1 (Abutting Properties)

Inflow Area = 4.146 ac, 46.74% Impervious, Inflow Depth > 1.82" for 25-Year Storm event
Inflow = 7.50 cfs @ 12.16 hrs, Volume= 0.628 af
Outflow = 7.50 cfs @ 12.16 hrs, Volume= 0.628 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Reach ER1: Existing Reach ER1 (Abutting Properties)

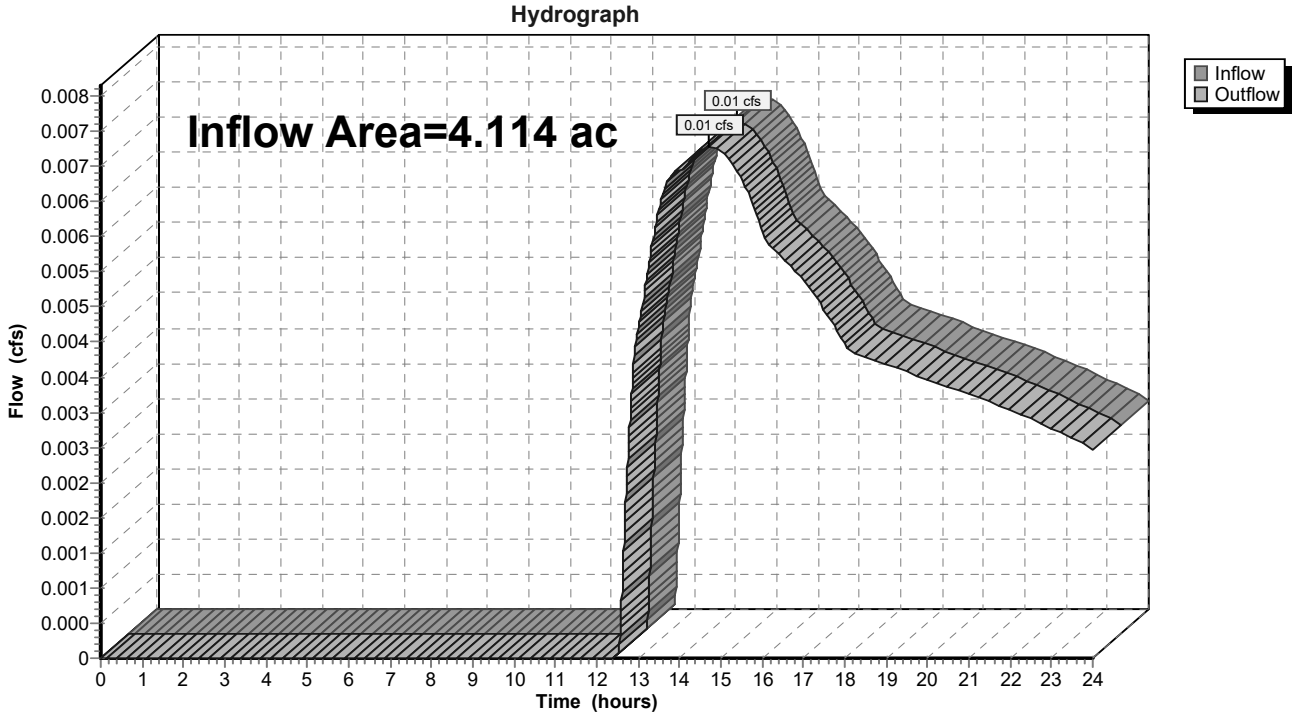


Summary for Reach PR1: Proposed Reach PR1 (Abutting Properties)

Inflow Area = 4.114 ac, 47.57% Impervious, Inflow Depth > 0.01" for 25-Year Storm event
Inflow = 0.01 cfs @ 14.72 hrs, Volume= 0.005 af
Outflow = 0.01 cfs @ 14.72 hrs, Volume= 0.005 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Reach PR1: Proposed Reach PR1 (Abutting Properties)



Summary for Pond ES1: Exist. CBs ES1 (Infiltration CBs and Surface Ponding)

Inflow Area = 3.654 ac, 52.16% Impervious, Inflow Depth > 2.12" for 25-Year Storm event
Inflow = 7.75 cfs @ 12.14 hrs, Volume= 0.647 af
Outflow = 7.52 cfs @ 12.16 hrs, Volume= 0.630 af, Atten= 3%, Lag= 1.5 min
Discarded = 0.01 cfs @ 10.34 hrs, Volume= 0.014 af
Primary = 7.50 cfs @ 12.16 hrs, Volume= 0.616 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 45.05' @ 12.16 hrs Surf.Area= 63 sf Storage= 1,494 cf

Plug-Flow detention time= 21.4 min calculated for 0.630 af (97% of inflow)
Center-of-Mass det. time= 7.0 min (859.7 - 852.7)

Volume	Invert	Avail.Storage	Storage Description
#1	44.50'	11,423 cf	**Surface Ponding (Prismatic)** Listed below (Recalc) -Impervious
#2	38.79'	74 cf	**4.00'D x 5.90'H CB1**
#3	39.65'	63 cf	**4.00'D x 5.00'H CB2**
#4	40.00'	560 cf	**4.00'D x 44.55'H CB3**
#5	40.29'	54 cf	**4.00'D x 4.30'H CB4**
#6	38.44'	88 cf	**4.00'D x 7.00'H CB5**
#7	42.94'	9 cf	**6.0" Round Pripe From CB3 to CB4** -Impervious L= 44.0' S= 0.0170 '/'
#8	42.64'	14 cf	**6.0" Round Pipe from CB4 to CB5** -Impervious L= 70.0' S= 0.0042 '/'
		12,284 cf	Total Available Storage

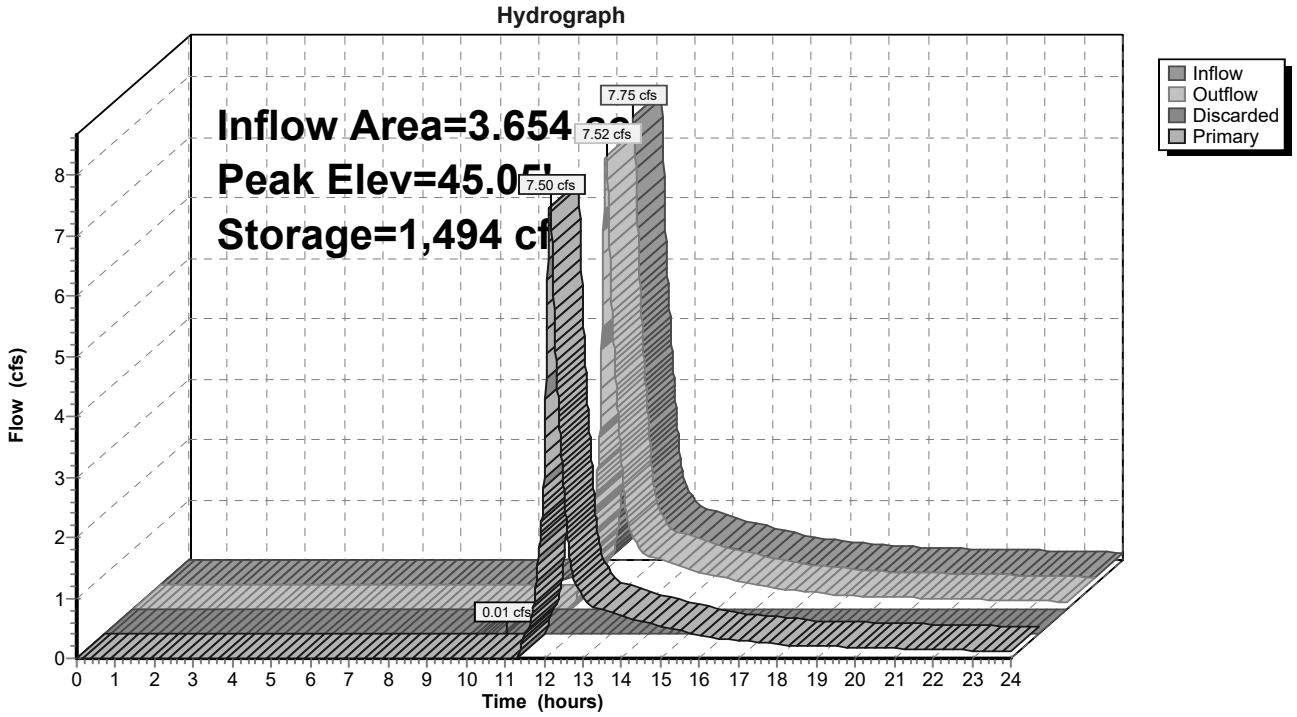
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
44.50	32	0	0
45.00	3,702	934	934
46.00	17,277	10,490	11,423

Device	Routing	Invert	Outlet Devices
#1	Primary	44.80'	**25.0' long x 6.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.37 2.51 2.70 2.68 2.68 2.67 2.65 2.65 2.65 2.65 2.66 2.66 2.67 2.69 2.72 2.76 2.83
#2	Discarded	38.44'	**8.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.01 cfs @ 10.34 hrs HW=40.31' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=7.50 cfs @ 12.16 hrs HW=45.05' TW=0.00' (Dynamic Tailwater)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 7.50 cfs @ 1.20 fps)

Pond ES1: Exist. CBs ES1 (Infiltration CBs and Surface Ponding)



Summary for Pond ES2: Exist. CB ES2 (Infiltration CB and Surface Ponding)

Inflow Area = 0.473 ac, 34.04% Impervious, Inflow Depth > 1.35" for 25-Year Storm event
Inflow = 0.53 cfs @ 12.19 hrs, Volume= 0.053 af
Outflow = 0.07 cfs @ 13.78 hrs, Volume= 0.028 af, Atten= 86%, Lag= 95.1 min
Discarded = 0.00 cfs @ 11.67 hrs, Volume= 0.002 af
Primary = 0.07 cfs @ 13.78 hrs, Volume= 0.026 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 49.51' @ 13.78 hrs Surf.Area= 13 sf Storage= 1,147 cf

Plug-Flow detention time= 269.5 min calculated for 0.028 af (53% of inflow)
Center-of-Mass det. time= 134.8 min (1,018.2 - 883.4)

Volume	Invert	Avail.Storage	Storage Description
#1	48.60'	1,931 cf	**Surface Ponding (Prismatic)** Listed below (Recalc) -Impervious
#2	42.60'	69 cf	**4.00'D x 5.50'H Exist. CB**
		2,000 cf	Total Available Storage

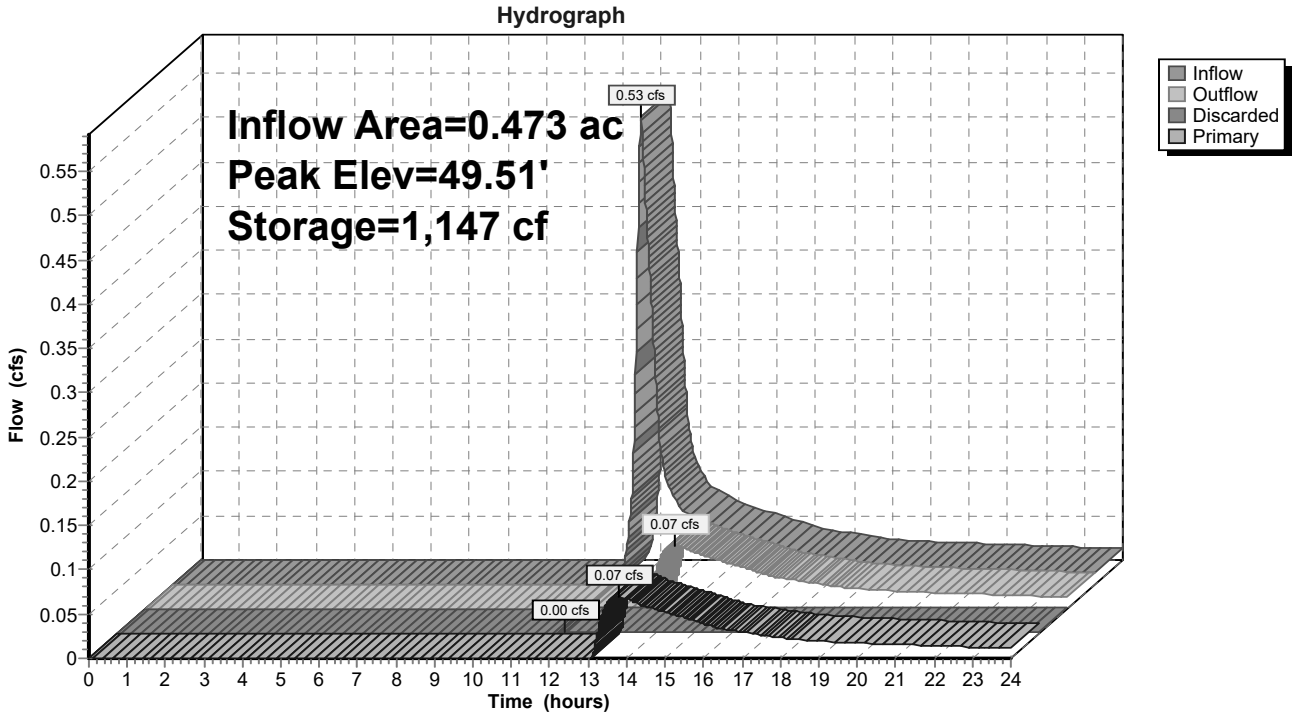
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
48.60	4	0	0
49.00	230	47	47
49.70	5,153	1,884	1,931

Device	Routing	Invert	Outlet Devices
#1	Primary	49.49'	**10.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64
#2	Discarded	42.60'	**8.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.00 cfs @ 11.67 hrs HW=42.68' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=0.07 cfs @ 13.78 hrs HW=49.51' TW=48.43' (Dynamic Tailwater)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 0.07 cfs @ 0.35 fps)

Pond ES2: Exist. CB ES2 (Infiltration CB and Surface Ponding)



Summary for Pond ES3: Exist. CB ES3 (Infiltration CB and Surface Ponding)

Inflow Area = 0.576 ac, 43.40% Impervious, Inflow Depth > 1.33" for 25-Year Storm event
Inflow = 0.47 cfs @ 12.12 hrs, Volume= 0.064 af
Outflow = 0.46 cfs @ 12.13 hrs, Volume= 0.061 af, Atten= 2%, Lag= 1.0 min
Discarded = 0.00 cfs @ 6.44 hrs, Volume= 0.004 af
Primary = 0.46 cfs @ 12.13 hrs, Volume= 0.057 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 48.47' @ 12.13 hrs Surf.Area= 13 sf Storage= 145 cf

Plug-Flow detention time= 35.5 min calculated for 0.061 af (96% of inflow)
Center-of-Mass det. time= 14.6 min (893.6 - 879.0)

Volume	Invert	Avail.Storage	Storage Description
#1	48.07'	213 cf	**Surface Ponding (Prismatic)** Listed below (Recalc) -Impervious
#2	46.30'	23 cf	**4.00'D x 1.80'H Infiltration CB**
		236 cf	Total Available Storage

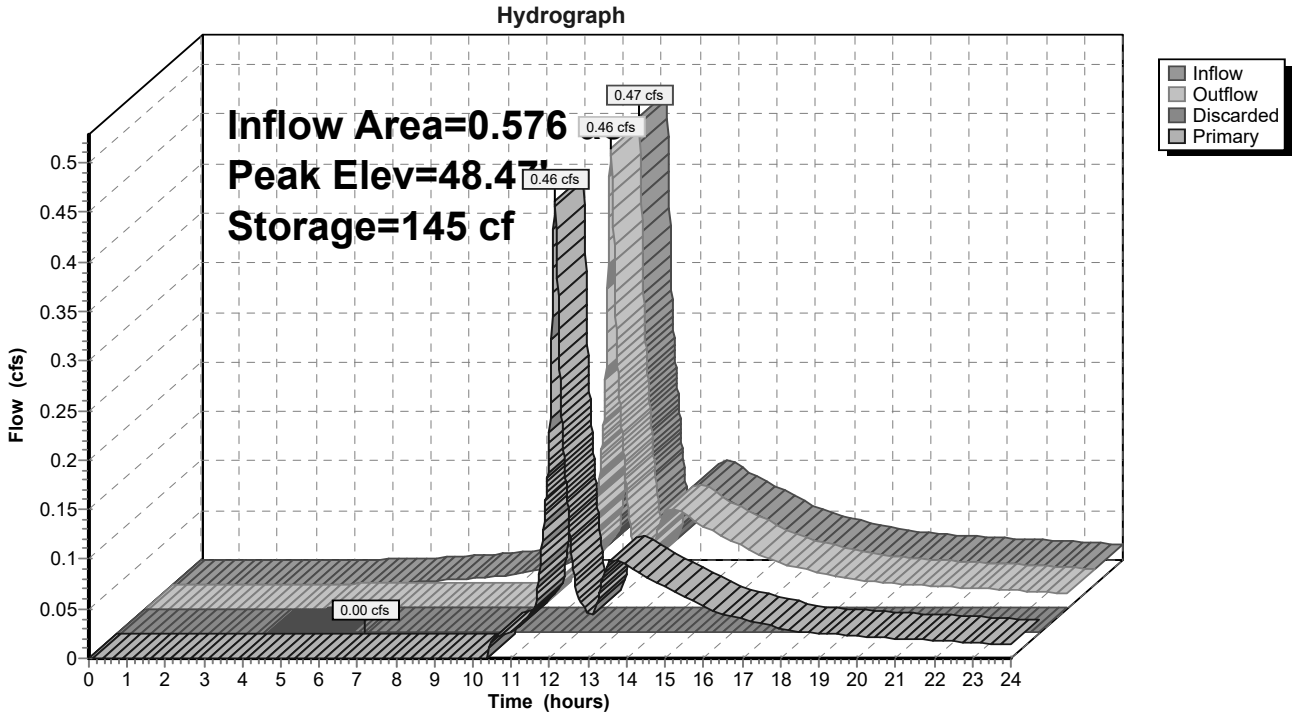
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
48.07	4	0	0
48.60	801	213	213

Device	Routing	Invert	Outlet Devices
#1	Primary	48.40'	**10.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64
#2	Discarded	46.30'	**8.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.00 cfs @ 6.44 hrs HW=46.32' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=0.46 cfs @ 12.13 hrs HW=48.47' TW=45.04' (Dynamic Tailwater)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 0.46 cfs @ 0.66 fps)

Pond ES3: Exist. CB ES3 (Infiltration CB and Surface Ponding)



Summary for Pond PS1: Infiltration system 1 (Overall Sum of Systems Onsite), Cultech Recharger 330

Inflow Area = 3.716 ac, 52.56% Impervious, Inflow Depth > 2.30" for 25-Year Storm event
Inflow = 8.80 cfs @ 12.14 hrs, Volume= 0.712 af
Outflow = 1.16 cfs @ 13.00 hrs, Volume= 0.712 af, Atten= 87%, Lag= 51.8 min
Discarded = 1.16 cfs @ 13.00 hrs, Volume= 0.712 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 3.94' @ 13.00 hrs Surf.Area= 0.103 ac Storage= 0.251 af

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 86.2 min (934.8 - 848.6)

Volume	Invert	Avail.Storage	Storage Description
#1A	0.00'	0.109 af	**26.17'W x 172.00'L x 4.04'H Field A** 0.418 af Overall - 0.145 af Embedded = 0.273 af x 40.0% Voids
#2A	1.00'	0.145 af	**Cultec R-330XLHD** x 120 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 5 rows
#3	0.00'	0.002 af	**4.00'D x 8.00'H Vertical Cone/Cylinder** Impervious
		0.256 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	**8.270 in/hr Exfiltration over Wetted area**

Discarded OutFlow Max=1.16 cfs @ 13.00 hrs HW=3.94' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 1.16 cfs)

PS1: Infiltration system 1 (Overall Sum of Systems Onsite), Cultech Recharger 330HD - Chamber Wiza

Chamber Model = Cultec R-330XLHD (Cultec Recharger® 330XLHD)
Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf
Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap
Row Length Adjustment= +1.50' x 7.45 sf x 5 rows

52.0" Wide + 6.0" Spacing = 58.0" C-C Row Spacing

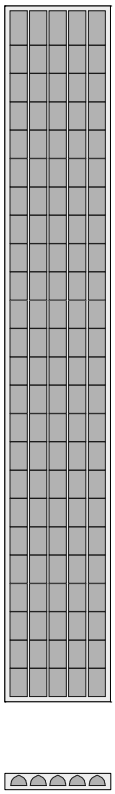
24 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 169.50' Row Length +15.0" End Stone x 2 = 172.00' Base Length
5 Rows x 52.0" Wide + 6.0" Spacing x 4 + 15.0" Side Stone x 2 = 26.17' Base Width
12.0" Base + 30.5" Chamber Height + 6.0" Cover = 4.04' Field Height

120 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 5 Rows = 6,314.7 cf Chamber Storage

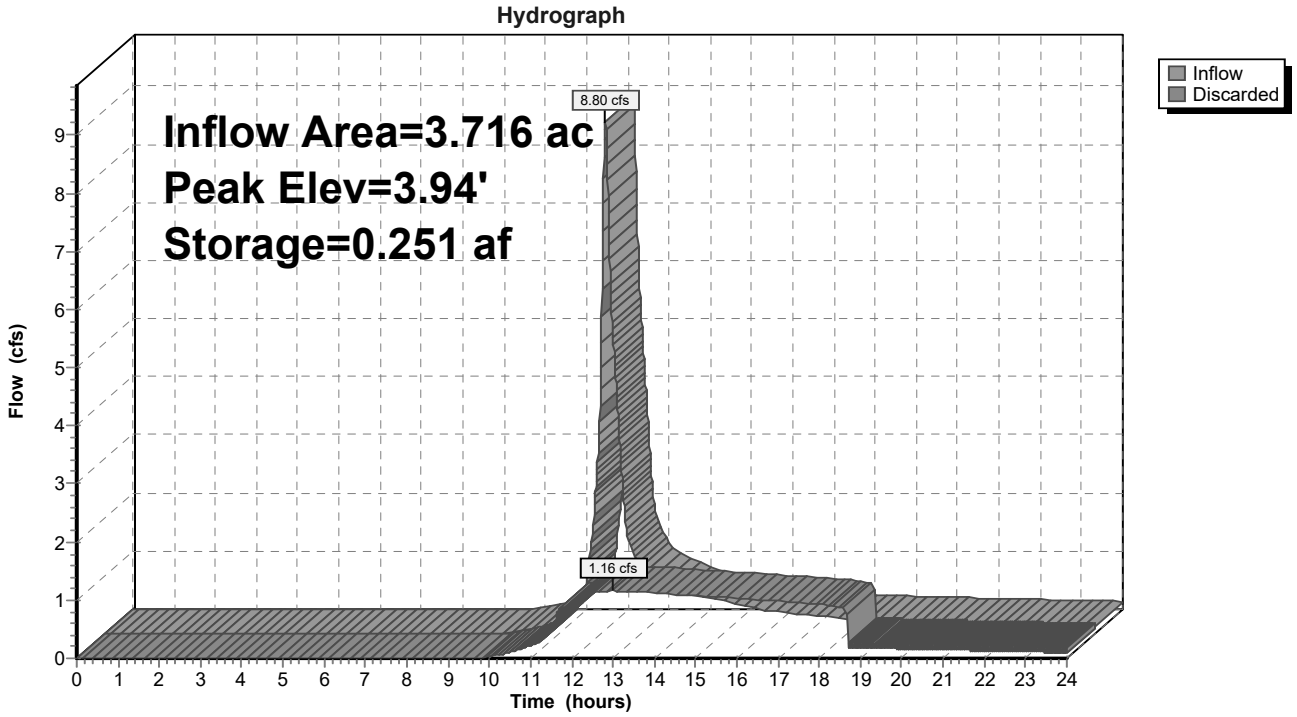
18,190.2 cf Field - 6,314.7 cf Chambers = 11,875.5 cf Stone x 40.0% Voids = 4,750.2 cf Stone Storage

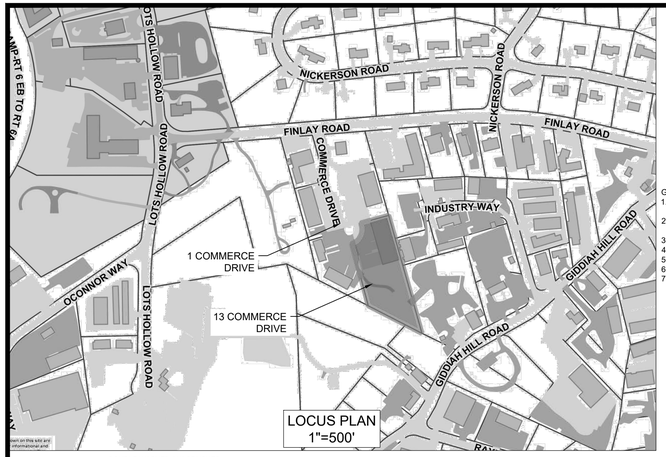
Chamber Storage + Stone Storage = 11,064.9 cf = 0.254 af
Overall Storage Efficiency = 60.8%
Overall System Size = 172.00' x 26.17' x 4.04'

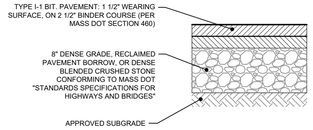
120 Chambers
673.7 cy Field
439.8 cy Stone



Pond PS1: Infiltration system 1 (Overall Sum of Systems Onsite), Cultech Recharger 330HD

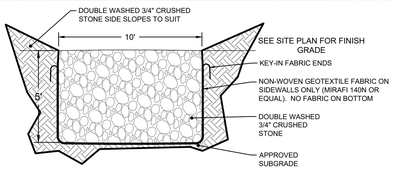




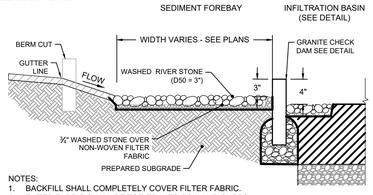


GENERAL NOTES:
1. SUB-GRADE (EXISTING MATERIAL) SHALL CONSIST OF INERT MATERIAL THAT IS HARD, DURABLE STONE AND/OR COARSE SAND, FREE FROM LOAM AND CLAY.
2. EXCAVATE SANDY-LOAM AND/OR LOAMY-SAND TOPSOIL MATERIAL FROM ALL PAVED AREAS PRIOR TO SUB-BASE INSTALLATION.
3. PLACE SUB-BASE IN MAXIMUM 8" LIFTS (COMPACTED TO 95%).
4. COMPACT SUB-GRADE FILL TO 95% COMPACTION.
5. SEE SITE LAYOUT PLAN FOR PAVEMENT WIDTH AND LOCATION.
6. SEE GRADING PLANS FOR PAVEMENT SLOPE AND CROSS SLOPE.
7. SWEEP CLEAN THE EXISTING BINDER COURSE SURFACE PRIOR TO INSTALLING THE WEARING COURSE. BY A STREET SWEEPING MACHINE . APPLY A TACK COAT PER SPECIFICATIONS.

BITUMINOUS PAVEMENT
NOT TO SCALE



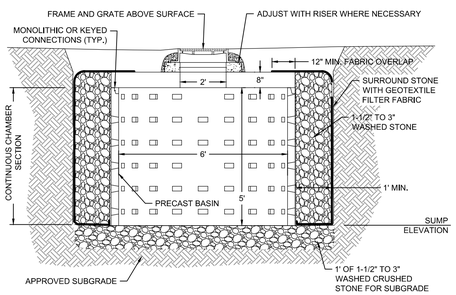
INFILTRATION TRENCH DETAIL
NOT TO SCALE



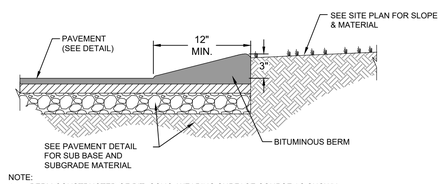
NOTES:
1. BACKFILL SHALL COMPLETELY COVER FILTER FABRIC.
2. FILTER FABRIC SHALL BE TOE-ED INTO SOIL AND CURBS
3. SHAPE FOREBAY AS REQUIRED WITH MIN. 6" SIDE SLOPE DEPTH, BOULDERS OR CURB ALONG SIDES OR FOREBAY FOR CONTAINMENT.

SEDIMENT FOREBAY TYPE 1
NOT TO SCALE

NOTES:
1. ALL SECTIONS TO BE DESIGNED FOR H20 LOADING.
2. PROVIDE "V" KNOCKOUTS FOR PIPES WITH 2" MAX. CLEARANCE TO OUTSIDE OF PIPE. MORTAR ALL PIPE CONNECTIONS.
3. RECHARGE BASIN FRAME AND GRATE TO BE SET IN FULL MORTAR BED. ADJUST TO GRADE WITH PRECAST CONCRETE RISER OR BRICK & MORTAR.
4. FRAME AND GRATE HALL CONFORM TO MASSACHUSETTS STANDARDS TYPICAL FOR H20 LOADING.
5. GEOTEXTILE FILTER FABRIC TO BE MIRAFI 140N OR EQUIVALENT

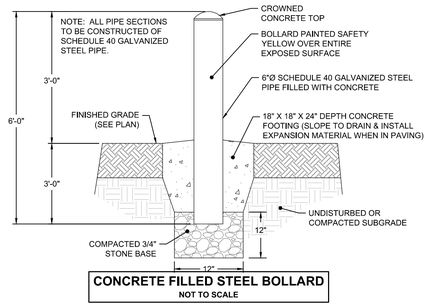


TYPICAL RECHARGE CATCHBASIN (RCB) DETAIL
NOT TO SCALE

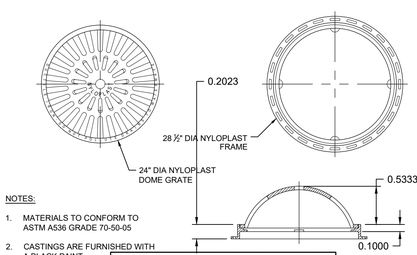


NOTE:
1. BERM CONSTRUCTED OF BIT. CONC. WEARING SURFACE COURSE AS SHOWN
2. PROVIDE 1" CHAMFER OF EDGE ALONG BERM FACE
3. BERM TO BE CONSTRUCTED INTEGRAL WITH TOP PAVEMENT COURSE.

CAPE COD STYLE BITUMINOUS BERM
NOT TO SCALE



CONCRETE FILLED STEEL BOLLARD
NOT TO SCALE



NOTES:
1. MATERIALS TO CONFORM TO ASTM A536 GRADE 70-50-05
2. CASTINGS ARE FURNISHED WITH A BLACK PAINT

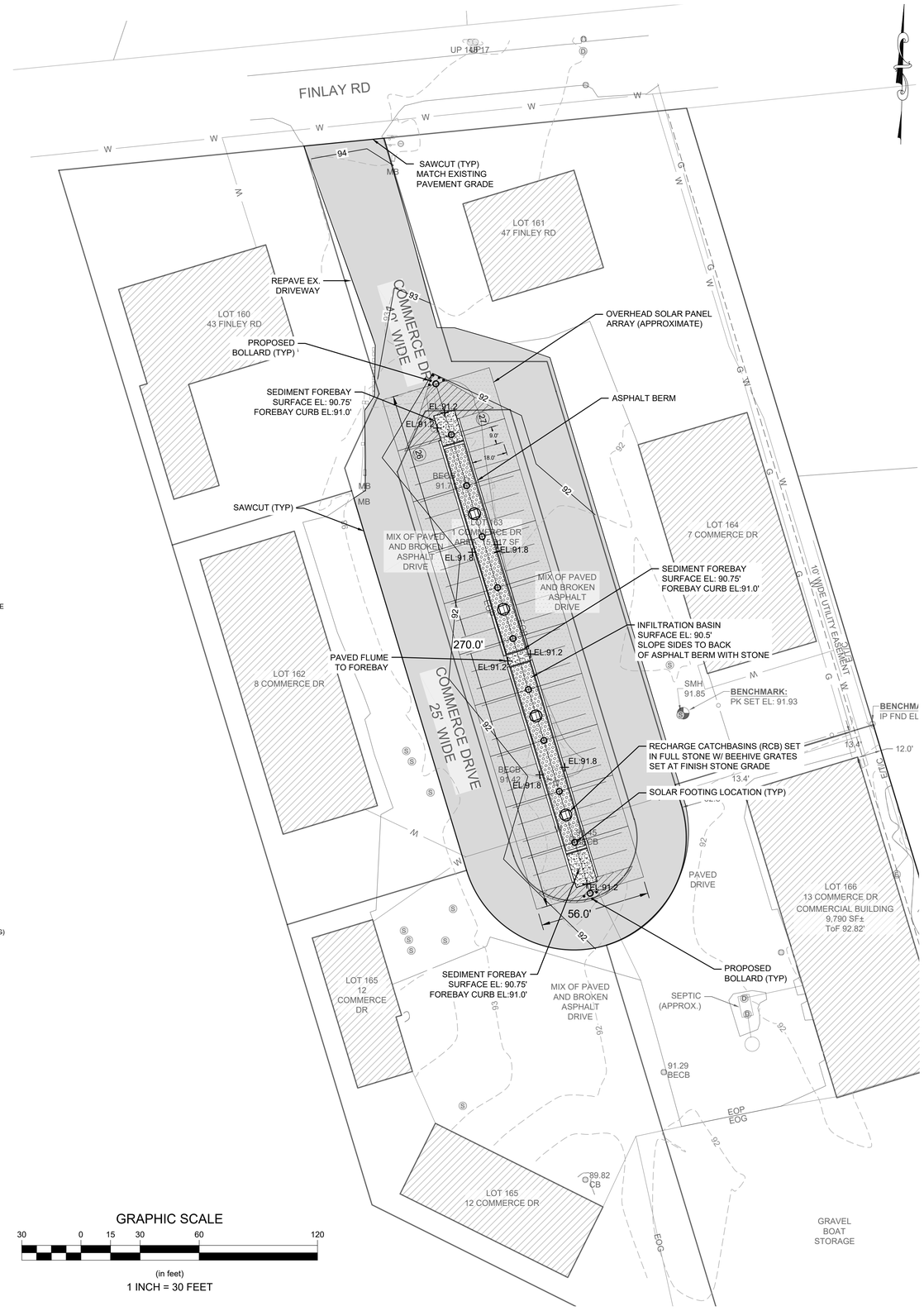
DOME FRAME AND GRATE DETAIL
NOT TO SCALE

LEGEND

- BUILDING
- CONTOUR - MINOR (44)
- CONTOUR - MAJOR (50)
- CURB
- EDGE OF PAVEMENT
- GUARD RAIL
- FENCE
- RIP RAP
- TREE LINE
- WALL - RETAINING
- WALL - STONE
- ABUTTING LOT
- EASEMENT LINE
- PROPERTY OR ROW
- SETBACK LINE
- DRAIN PIPE (D D D)
- OVERHEAD WIRE (OHW)
- WATER LINE (W)
- WETLAND BOUNDARY
- WETLAND 50 BUFFER (BZ 50)
- WETLAND 100 BUFFER
- RIVERFRONT BOUNDARY
- OUTER RIVERFRONT (0-100)
- OUTER RIVERFRONT (100-200)
- COASTAL BANK
- COASTAL BANK 50 BUFFER (CB50 CB50)
- COASTAL BANK 100 BUFFER
- FEMA FLOOD ZONE

SYMBOLS

- BENCHMARK
- BOUNDARY (CB)
- CONTROL POINT
- EXISTING SHRUB
- EXISTING TREE
- EXISTING EVERGREEN TREE
- SPOT GRADE (100)
- SEWER MANHOLE
- ELECTRIC MANHOLE
- TELEPHONE MANHOLE
- MANHOLE
- TV BOX
- DRAIN MANHOLE
- SIGN
- CATCHBASIN
- FLARED END OUTLET
- RIP RAP APRON
- WATER VALVE
- SEWER VALVE
- GAS VALVE
- UTILITY BOX
- HYDRANT
- UTILITY POLE W/GUY (UP)
- TEST PIT (TP)
- BORING (B#)
- WETLAND FLAG (WF)
- MAIL BOX
- ROCK



GRAPHIC SCALE

30 0 15 30 60 120

(in feet)

1 INCH = 30 FEET

STRONG TREE ENGINEERING
www.strongtree.engineering
Ph: (774) 559-3942
P.O. Box 62
Sagamore Beach, MA 02562

Revisions

REV.	DATE	BY	CHECK	DESCRIPTION
1	#	#	#	#
2	#	#	#	#
3	#	#	#	#
4	#	#	#	#
5	#	#	#	#

PROJECT:
#1 & 13 COMMERCE DRIVE
ORLEANS, MASSACHUSETTS

SHEET TITLE:
PROPOSED SOLAR SITE PLAN

PREPARED FOR:
MY GENERATION ENERGY
C/O JOE BUCK
100 INDEPENDENCE DRIVE, SUITE #10
HYANNIS, MA 02601

Certification:
COMMONWEALTH OF MASSACHUSETTS
JUSTIN J. LAMOUREUX
CIVIL
No.47377
REGISTERED PROFESSIONAL ENGINEER
6/30/25

Project Number: 25053
Sheet : 1 of 1
Sheet Number: C - 1
Date: 06/30/25

Registration:
I certify that the buildings and existing information shown hereon were located by field survey as they exist on the ground.

Signed/Date:

REFERENCE MAPS/DEEDS:
1. DEED 13 COMMERCE: L.C. 224991
2. LAND COURT PLAN #18010-13
3. LAND COURT PLAN #18010-11

GENERAL NOTES:
1. COPYRIGHT, STRONG TREE ENGINEERING ALL RIGHTS RESERVED.
2. ONLY SURVEY MAPS WITH THE SURVEYOR'S SIGNED SEAL ARE GENUINE TRUE AND CORRECT COPIES OF THE SURVEYOR'S ORIGINAL WORK AND OPINION.
3. THE CERTIFICATIONS HEREON ARE NOT TRANSFERABLE.
4. THE LOCATIONS OF UNDERGROUND IMPROVEMENTS OR ENCROACHMENTS ARE NOT ALWAYS KNOWN AND OFTEN MUST BE ESTIMATED. IF ANY UNDERGROUND IMPROVEMENTS OR ENCROACHMENTS EXIST OR ARE SHOWN, THE IMPROVEMENTS OR ENCROACHMENTS ARE NOT COVERED BY THIS CERTIFICATE.
5. THE TYPE OF MAP PERFORMED IS A BOUNDARY SURVEY. THE BOUNDARY LINES AS DEPICTED ARE THE RESULT OF AN ACCURATE LAND SURVEY AND ARE DEPICTED FROM RECORD MAPS AND DEEDS.
6. PARCEL IS NOT LOCATED WITHIN A FEMA FLOOD ZONE PER AVAILABLE REFERENCES.
7. ELEVATIONS DEPICTED HEREON ARE BASED ON NAVD88 DATUM. HORIZONTAL: MASSACHUSETTS MAINLAND NAD83

SITE PLAN REVIEW REQUEST AND PROJECT DESCRIPTION FORM

TYPE OF REVIEW: FORMAL _____ INFORMAL ✓

SUBMISSION DATE 7/18/2025 REVIEW DATE _____ TIME_____

ASSESSOR'S MAP NO. _____ LOT _____

LOCATION OF PROJECT: 1 Commerce Dr. Orleans, MA 02653

NAME OF BUSINESS/PROJECT:_____

APPLICANT NAME: Luminous Solar LLC

APPLICANT ADDRESS/PHONE NO.: 436 Old Queen Anne Rd. Chatham, MA

OWNER NAME (if not applicant):_____

OWNER ADDRESS/PHONE NO.:_____

ENGINEER/SURVEYOR (if applicable): Domingo A. Villaruel

DESCRIPTION OF PROJECT (attach additional pages if necessary):

Design, provision, and installation of a 522-module canopy-mounted, grid interconnected solar photovoltaic array.

IF CHANGE OF USE, INDICATE PREVIOUS USE _____

ZONING DISTRICT: _____ FLOOD ZONE:_____

BUILDING SIZE (square feet) Attach floor plans._____

BASEMENT: _____ FIRST FLOOR: _____ SECOND FLOOR: _____

MAXIMUM NUMBER OF EMPLOYEES:_____

MAXIMUM OCCUPANCY FOR RESTAURANTS, PLACES OF ASSEMBLY, etc.:_____

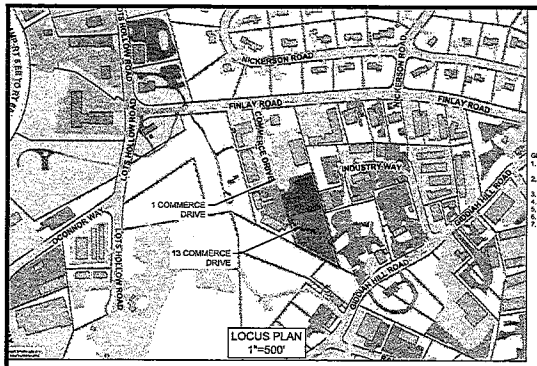
USE WOULD/WOULD NOT REQUIRE ALTERATION TO THE SEWAGE DISPOSAL SYSTEM:_____

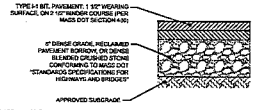
BOARD OF APPEALS ACTION EXPECTED:_____

IS THE PROPOSED CONSTRUCTION WITHIN 100 FEET OF A WETLAND?_____

SIGNED_____

Please submit seven copies of the Site Plan Review application and seven sets of plans





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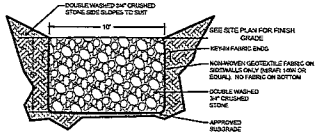
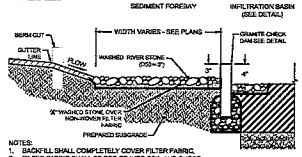
BITUMINOUS PAVEMENT
NOT TO SCALE



INFILTRATION TRENCH DETAIL
NOT TO SCALE



NOTES:
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2. FILTER FABRIC SHALL BE TORE-ED INTO SOIL AND CURBS.
3. SHAPE FOREBAY AS REQUIRED WITH MIN. 6" SIDE SLOPE DEPTH. BOULDERS OR CURB ALONG SIDES OR FOREBAY FOR CONTAINMENT.

SEDIMENT FOREBAY TYPE 1
NOT TO SCALE

NOTES:
1. ALL SECTIONS TO BE DESIGNED FOR H20 LOADING.
2. PROVIDE "V" KNOCKOUTS FOR PIPES WITH 2" MAX. CLEARANCE TO OUTSIDE OF PIPE. MORTAR ALL PIPE CONNECTIONS.
3. RECHARGE BASIN FRAME AND GRATE TO BE SET IN FULL MORTAR BED. ADJUST TO GRADE WITH PRECAST CONCRETE RISER OR BRICK & MORTAR.
4. FRAME AND GRATE SHALL CONFORM TO MASSACHUSETTS STANDARDS TYPICAL FOR H20 LOADING.
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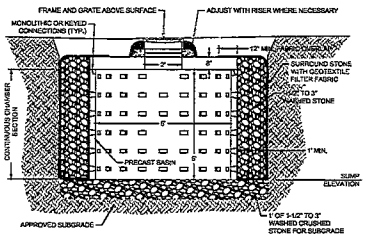

TYPICAL RECHARGE CATCHBASIN (RCB) DETAIL
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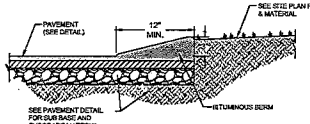

NOTE:
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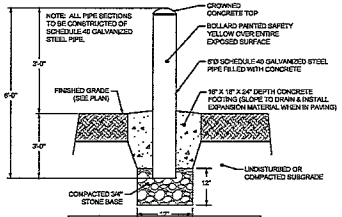
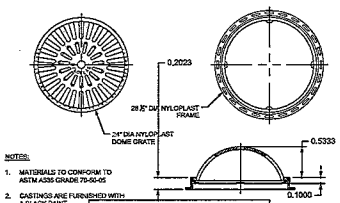
3. BERM TO BE CONSTRUCTED INTEGRAL WITH TOP PAVEMENT COURSE.

CAPE COD STYLE BITUMINOUS BERM
NOT TO SCALE



CONCRETE FILLED STEEL BOLLARD
NOT TO SCALE



NOTES:
1. MATERIALS TO CONFORM TO ASTM A335 GRADE 70-50-05
2. CASTINGS ARE FURNISHED WITH A BLACK PAINT

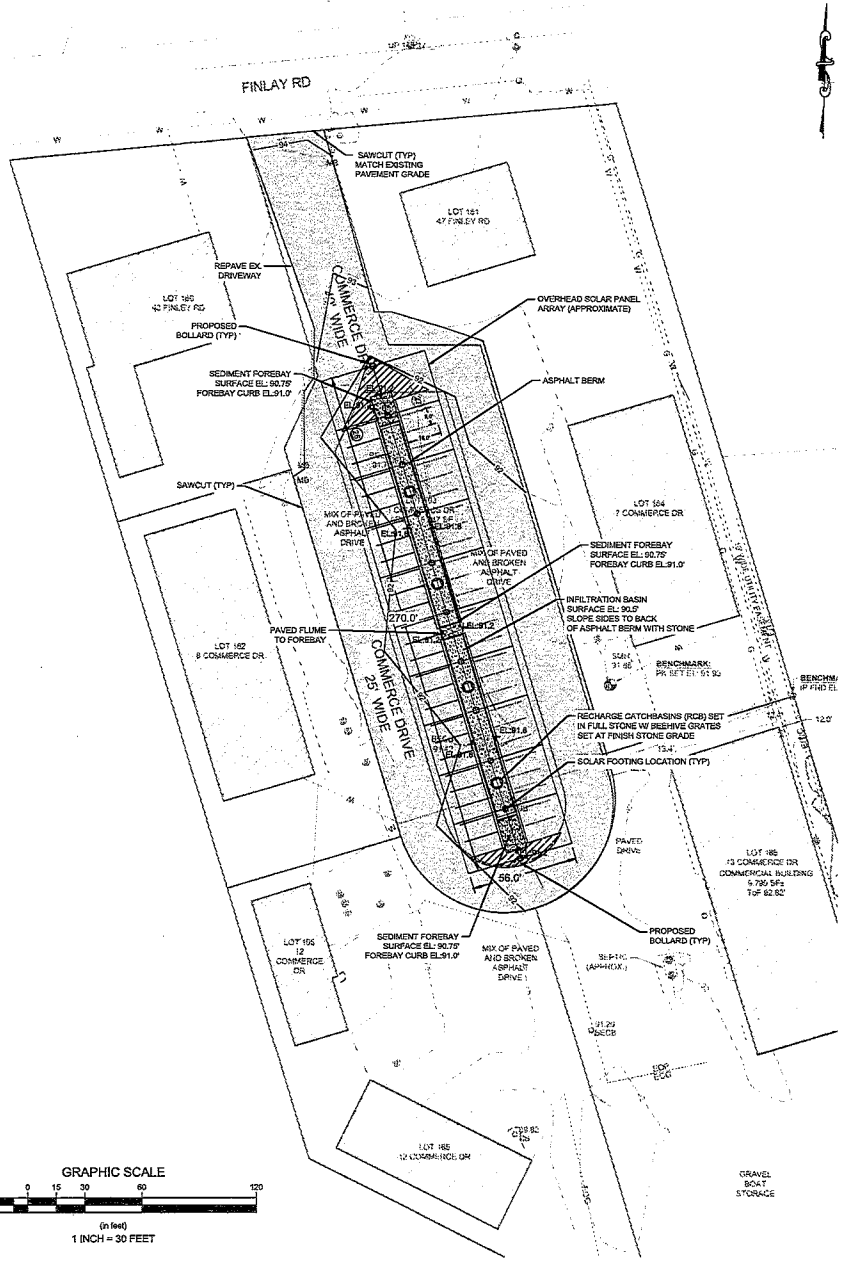
DOME FRAME AND GRATE DETAIL
NOT TO SCALE

LEGEND

	BUILDING
	CONTOUR - MINOR
	CONTOUR - MAJOR
	CURB
	EDGE OF PAVEMENT
	GUARD RAIL
	FENCE
	RIP RAP
	TREE LINE
	WALL - RETAINING
	WALL - STONE
	ABUTTERS LOT
	EASEMENT LINE
	PROPERTY OR ROW
	SETBACK LINE
D D D	DRAIN PIPE
OHW	OVER-HEAD WIRE
W	WATER LINE
	WETLAND BOUNDARY
BZ 50	WETLAND 50 BUFFER
	WETLAND 100 BUFFER
	RIVERFRONT BOUNDARY
	OUTER RIVERFRONT (0-100)
	OUTER RIVERFRONT (100-200)
	COASTAL BANK
CB50 CB50	COASTAL BANK 50 BUFFER
	COASTAL BANK 100 BUFFER
	FEMA FLOOD ZONE

SYMBOLS

BENCHMARK	CATCHBASIN
BOUNDARY	FLARED END OUTLET
CONTROL POINT	RIP RAP APRON
EXISTING SHRUB	WATER VALVE
EXISTING TREE	SEWER VALVE
EXISTING EVERGREEN TREE	GAS VALVE
SPOT GRADE	UTILITY BOX
SEWER MANHOLE	HYDRANT
ELECTRIC MANHOLE	UTILITY POLE W/GUY
TELEPHONE MANHOLE	TEST PIT
MANHOLE	BORING
TV BOX	WETLAND FLAG
DRAIN MANHOLE	MAIL BOX
SIGN	ROCK



GRAPHIC SCALE
30 0 15 30 60 120
(in feet)
1 INCH = 30 FEET

STRONG TREE ENGINEERING
www.strongtree.engineering
Ph: (774) 593-3942
P.O. Box 62
Sagamore Beach, MA 02562

Revisions

REV.	DATE	BY	CHECK	DESCRIPTION
1	#	#	#	#
2	#	#	#	#
3	#	#	#	#
4	#	#	#	#
5	#	#	#	#

PROJECT:
#1 & 13 COMMERCE DRIVE
ORLEANS, MASSACHUSETTS

SHEET TITLE:
PROPOSED SOLAR SITE PLAN

PREPARED FOR:
MY GENERATION ENERGY
C/O JOE BUCK
100 INDEPENDENCE DRIVE, SUITE #10
HYANNIS, MA 02601

Certification: COMMONWEALTH OF MASSACHUSETTS JUSTIN J. LAMOUREUX CIVIL No.47377 REGISTERED PROFESSIONAL ENGINEER 6/30/25

Project Number:	Sheet:
25053	1 of 1
Sheet Number:	
C - 1	
Date:	
06/30/25	

Registration:
I certify that the buildings and existing information shown hereon were located by field survey as they exist on the ground.

Signed/Date:

REFERENCE MAPS/DEEDS:
1. DEED 13 COMMERCE L.C. 524991
2. LAND COURT PLAN #18018-13
3. LAND COURT PLAN #18018-11

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6. PARCEL IS NOT LOCATED WITHIN A FEMA FLOOD ZONE PER AVAILABLE REFERENCES.
7. ELEVATIONS DEPICTED HEREON ARE BASED ON NAVD88 DATUM, HORIZONTAL: MASSACHUSETTS MAINLAND NAD83

STRUCTURAL CALCULATIONS

FOR

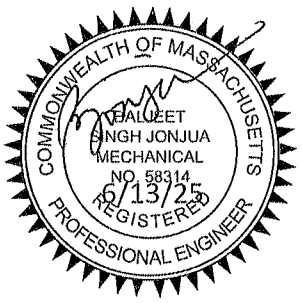
T-Frame Carport System

Location:

1 Commerce Dr,
Orleans, MA 02653
Barnstable County

Prepared For:

Solar Mounts, LLC
300 Woolley Drive
Marshall, MI 49068



SE Project #: SML.24.047
12 June 2025

SERVINSKY ENGINEERING & ASSOCIATES
Consulting Structural Engineers
280 Douglas Avenue
Holland, MI 49424
616-738-1281
www.servinskyeng.com

Truss Loads					SML.25.047	Theta	Clear
Post Spacing		27	ft		3.5+3.5 T	7	

Collateral Load			Roof Live Load		
P_c	3	psf	P_r	12	psf
	81	lbs/ft		324	lbs/ft

Snow Load		
P_g	25	psf
C_e	0.9	
C_t	1.2	
I	1	
P_f	25	psf
C_s	1	
P_s	25	psf
	675	lbs/ft

Purlin Contribution Width	4.04
Collateral	12.12
Roof Live	48.48
Snow Load	101.00
Perp1 Top Case A	92.44
Perp2 Top Case A	23.11
Perp1 Top Case B	-84.74
Perp2 Top Case B	-7.70
Perp1 Bottom Case A	23.11
Perp2 Bottom Case A	92.44
Perp1 Bottom Case B	-7.70
Perp2 Bottom Case B	-84.74
Parall Case A	61.63
Parall Case B	-61.63

Wind Pressure					
V	130	mph	K_z	0.61	
I**	N/A		K_h	0.61	
			Ke	1	
K_{zt}	1.00		K_d	0.85	
			q_z	22.43	psf
**Importance Factor is no longer used in Wind Analysis			q_h	22.43	psf
			G	0.85	

Wind Load Perpendicular		
Span	98	ft
h_{arch}	21	ft
wall	2.1	ft
ratio	0.21	

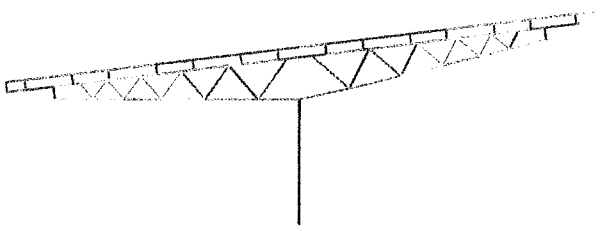
Roof	Cn	psf	lbs/ft	
Top Perpendicular Case A	1.200	22.881	617.79	Negative acts away from surface
Bottom Perpendicular Case A	0.300	5.720	154.45	
Bottom Perpendicular Case A	1.200	22.881	617.79	
Top Perpendicular Case A	0.300	5.720	154.45	
Top Perpendicular Case B	-1.100	-20.974	-566.31	
Bottom Perpendicular Case B	-0.100	-1.907	-51.48	
Bottom Perpendicular Case B	-1.100	-20.974	-566.31	
Top Perpendicular Case B	-0.100	-1.907	-51.48	

Wind Load Parallel			
Roof	C_p	psf	lbs/ft
Controlling Case A	0.8	15.254	411.86
Controlling Case B	-0.8	-15.254	-411.86

Note: Negative C_p Values act away from surface

RAM Elements

Current Date: 6/4/2025 5:29 PM
Units system: English



RAM Elements

Current Date: 6/4/2025 5:30 PM
Units system: English

Steel Code Check
Comprehensive Report

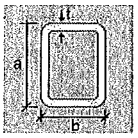
AISC 360-2016 ASD (Hot-rolled)

Member : 76 (Top Cord) - OK

Section information

Section name: HSS_RECT 5X5X0.25 **(US)**

Dimensions



a	=	5.000	[in]	Height
b	=	5.000	[in]	Width
T	=	0.250	[in]	Thickness

Properties	Unit	Major axis	Minor axis
Gross area of the section. (Ag)	[in2]	4.597	
Moment of Inertia (local axes) (I)	[in4]	16.958	16.958
Moment of Inertia (principal axes) (I')	[in4]	16.958	16.958
Bending constant for moments (principal axis) (J')	[in]	0.000	0.000
Radius of gyration (local axes) (r)	[in]	1.921	1.921
Radius of gyration (principal axes) (r')	[in]	1.921	1.921
Saint-Venant torsion constant. (J)	[in4]	27.382	
Section warping constant. (Cw)	[in6]	0.120	
Distance from centroid to shear center (principal axis) (xo,yo)	[in]	0.000	0.000
Top elastic section modulus of the section (local axis) (Ssup)	[in3]	6.783	6.783
Bottom elastic section modulus of the section (local axis) (Sinf)	[in3]	6.783	6.783
Top elastic section modulus of the section (principal axis) (S'sup)	[in3]	6.783	6.783
Bottom elastic section modulus of the section (principal axis) (S'inf)	[in3]	6.783	6.783
Plastic section modulus (local axis) (Z)	[in3]	8.086	8.086
Plastic section modulus (principal axis) (Z')	[in3]	8.086	8.086
Polar radius of gyration. (ro)	[in]	2.716	
Area for shear (Aw)	[in2]	2.125	2.125
Torsional constant. (C)	[in3]	11.219	

Material : A500 GrC rectangular

Properties	Unit	Value
Yield stress (Fy):	[Kip/in2]	50.00
Tensile strength (Fu):	[Kip/in2]	62.00
Elasticity Modulus (E):	[Kip/in2]	29000.00
Shear modulus for steel (G):	[Kip/in2]	11153.85

Design Criteria

Description	Unit	Value
Length for tension slenderness ratio (L)	[ft]	1.18

Distance between member lateral bracing points

Length (Lb) [ft] Top	Bottom
1.18	1.18

Laterally unbraced length

Length [ft] Major axis(L33)	Minor axis(L22)	Torsional axis(Lt)	Effective length factor Major axis(K33)	Minor axis(K22)	Torsional axis(Kt)
1.18	1.18	1.18	1.0	1.0	1.0

Additional assumptions

Continuous lateral torsional restraint	No
Tension field action	No
Continuous flexural torsional restraint	No
Effective length factor value type	None
Major axis frame type	Sway
Minor axis frame type	Sway

Design Checks

Axial Tension Design ✔

Axial tension

Ratio	:	0.20			
Capacity	:	137.63 [Kip]	Reference	:	Cl.D2
Demand	:	27.90 [Kip]	Ctrl Eq.	:	C32 at 100.00%

Intermediate results	Unit	Value	Reference
Factored axial tension capacity (P_n/Ω):	[Kip]	137.63	Cl.D2
Nominal axial tension capacity (P_n)	[Kip]	229.85	Eq.D2-1

Axial Compression Design ✔

Compression in the major axis 33

Ratio	:	0.08			
Capacity	:	137.09 [Kip]	Reference	:	Cl.E3
Demand	:	11.26 [Kip]	Ctrl Eq.	:	C62 at 0.00%

Intermediate results	Unit	Value	Reference
Section classification			
Unstiffened element classification	--	Non slender	
Unstiffened element slenderness (λ)	--	17.00	
Unstiffened element limiting slenderness (λ_r)	--	33.72	Table.B4.1a.Case6
Stiffened element classification	--	Non slender	
Stiffened element slenderness (λ)	--	17.00	
Stiffened element limiting slenderness (λ_r)	--	33.72	Table.B4.1a.Case6
Factored flexural buckling strength (P_{n33}/Ω):	[Kip]	137.09	Cl.E3
Effective length (KL_{33})	[ft]	1.18	Cl.E2
Effective slenderness ($(KL/r)_{33}$)	--	7.34	Cl.E2
Elastic critical buckling stress (F_{e33})	[Kip/in2]	5306.27	Eq.E3-4
Effective area of the cross section based on the effective width (A_{eff33})	[in2]	4.60	
Critical stress for flexural buckling (F_{cr33})	[Kip/in2]	49.80	Eq.E3-2
Nominal flexural buckling strength (P_{n33})	[Kip]	228.94	Eq.E3-1

Compression in the minor axis 22

Ratio	: 0.08			
Capacity	: 137.09 [Kip]	Reference	: Cl.E3	
Demand	: 11.26 [Kip]	Ctrl Eq.	: C62 at 0.00%	

Intermediate results	Unit	Value	Reference
Section classification			
Unstiffened element classification	--	Non slender	
Unstiffened element slenderness (λ)	--	17.00	
Unstiffened element limiting slenderness (λ_r)	--	33.72	Table.B4.1a.Case6
Stiffened element classification	--	Non slender	
Stiffened element slenderness (λ)	--	17.00	
Stiffened element limiting slenderness (λ_r)	--	33.72	Table.B4.1a.Case6
Factored flexural buckling strength (P_{n22}/Ω):	[Kip]	137.09	Cl.E3
Effective length (KL 22)	[ft]	1.18	Cl.E2
Effective slenderness ((KL/r) 22)	--	7.34	Cl.E2
Elastic critical buckling stress (F_{e22})	[Kip/in2]	5306.27	Eq.E3-4
Effective area of the cross section based on the effective width (A_{eff22})	[in2]	4.60	
Critical stress for flexural buckling (F_{cr22})	[Kip/in2]	49.80	Eq.E3-2
Nominal flexural buckling strength (P_{n22})	[Kip]	228.94	Eq.E3-1

Flexural Design

Bending about major axis, M33

Ratio	: 0.16			
Capacity	: 20.18 [Kip*ft]	Reference	: Cl.F7.1	
Demand	: -3.32 [Kip*ft]	Ctrl Eq.	: C32 at 0.00%	

Intermediate results	Unit	Value	Reference
Section classification			
Unstiffened element classification	--	Compact	
Unstiffened element slenderness (λ)	--	17.00	
Limiting slenderness for noncompact unstiffened element (λ_r)	--	33.72	
Limiting slenderness for compact unstiffened element (λ_p)	--	26.97	
Stiffened element classification	--	Compact	
Stiffened element slenderness (λ)	--	17.00	
Limiting slenderness for noncompact stiffened element (λ_r)	--	137.27	
Limiting slenderness for compact stiffened element (λ_p)	--	58.28	
Factored yielding strength (M_n/Ω):	[Kip*ft]	20.18	Cl.F7.1
Yielding (M_n)	[Kip*ft]	33.69	Eq.F7-1

Bending about minor axis, M22

Ratio	: 0.08			
Capacity	: 20.18 [Kip*ft]	Reference	: Cl.F7.1	
Demand	: 1.68 [Kip*ft]	Ctrl Eq.	: C87 at 100.00%	

Intermediate results	Unit	Value	Reference
Section classification			
Unstiffened element classification	--	Compact	
Unstiffened element slenderness (λ)	--	17.00	
Limiting slenderness for noncompact unstiffened element (λ_r)	--	33.72	
Limiting slenderness for compact unstiffened element (λ_p)	--	26.97	
Stiffened element classification	--	Compact	
Stiffened element slenderness (λ)	--	17.00	
Limiting slenderness for noncompact stiffened element (λ_r)	--	137.27	
Limiting slenderness for compact stiffened element (λ_p)	--	58.28	
Factored yielding strength about a geometric axis (M_n/Ω):	[Kip*ft]	20.18	Cl.F7.1
Yielding (M_n)	[Kip*ft]	33.69	Eq.F7-1

Shear Design ✔

Shear in major axis 33

Ratio	: 0.00			
Capacity	: 38.17 [Kip]	Reference	: Cl.G1	
Demand	: 0.12 [Kip]	Ctrl Eq.	: C87 at 0.00%	

Intermediate results	Unit	Value	Reference
Factored shear capacity (V_n/Ω):	[Kip]	38.17	Cl.G1
Web buckling coefficient (k_v)	--	5.00	Cl.G4
Web buckling coefficient (C_v)	--	1.00	Eq.G2-9
Nominal shear strength (V_n)	[Kip]	63.75	Eq.G4-1

Shear in minor axis 22

Ratio	: 0.08			
Capacity	: 38.17 [Kip]	Reference	: Cl.G1	
Demand	: 3.07 [Kip]	Ctrl Eq.	: C32 at 0.00%	

Intermediate results	Unit	Value	Reference
Factored shear capacity (V_n/Ω):	[Kip]	38.17	Cl.G1
Web buckling coefficient (k_v)	--	5.00	Cl.G4
Web buckling coefficient (C_v)	--	1.00	Eq.G2-9
Nominal shear strength (V_n)	[Kip]	63.75	Eq.G4-1

Torsion Design ✔

Torsion

Ratio	: 0.01			
Capacity	: 16.80 [Kip*ft]	Reference	: Cl.H3.1	
Demand	: -0.14 [Kip*ft]	Ctrl Eq.	: C87 at 0.00%	

Intermediate results	Unit	Value	Reference
Factored torsion capacity (T_n/Ω):	[Kip*ft]	16.80	Cl.H3.1
Critical torsional buckling stress (F_{cr})	[Kip/in2]	30.00	Eq.H3-3
Nominal torsion capacity (T_n)	[Kip*ft]	28.05	Eq.H3-1

Combined Actions Design ✔

Combined flexure and axial

Ratio	: 0.35			
Ctrl Eq.	: C32 at 0.00%	Reference	: Eq.H1-1a	

Intermediate results	Unit	Value	Reference
Interaction of flexure and axial force :	--	0.35	Eq.H1-1a
Available flexural strength about strong axis (M_{c33})	[Kip*ft]	20.18	Cl.H1.1
Available flexural strength about weak axis (M_{c22})	[Kip*ft]	20.18	Cl.H1.1
Available axial strength (P_c)	[Kip]	137.63	Cl.H1.1

RAM Elements

Current Date: 6/4/2025 5:31 PM
Units system: English

Steel Code Check
Comprehensive Report

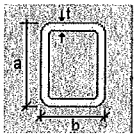
AISC 360-2016 ASD (Hot-rolled)

Member : 47 (Bottom Cord) - OK

Section information

Section name: HSS_RECT 5X5X0.25 **(US)**

Dimensions



a	=	5.000	[in]	Height
b	=	5.000	[in]	Width
T	=	0.250	[in]	Thickness

Properties	Unit	Major axis	Minor axis
Gross area of the section. (Ag)	[in2]	4.597	
Moment of Inertia (local axes) (I)	[in4]	16.958	16.958
Moment of Inertia (principal axes) (I')	[in4]	16.958	16.958
Bending constant for moments (principal axis) (J')	[in]	0.000	0.000
Radius of gyration (local axes) (r)	[in]	1.921	1.921
Radius of gyration (principal axes) (r')	[in]	1.921	1.921
Saint-Venant torsion constant. (J)	[in4]	27.382	
Section warping constant. (Cw)	[in6]	0.120	
Distance from centroid to shear center (principal axis) (xo,yo)	[in]	0.000	0.000
Top elastic section modulus of the section (local axis) (Ssup)	[in3]	6.783	6.783
Bottom elastic section modulus of the section (local axis) (Sinf)	[in3]	6.783	6.783
Top elastic section modulus of the section (principal axis) (S'sup)	[in3]	6.783	6.783
Bottom elastic section modulus of the section (principal axis) (S'inf)	[in3]	6.783	6.783
Plastic section modulus (local axis) (Z)	[in3]	8.086	8.086
Plastic section modulus (principal axis) (Z')	[in3]	8.086	8.086
Polar radius of gyration. (ro)	[in]	2.716	
Area for shear (Aw)	[in2]	2.125	2.125
Torsional constant. (C)	[in3]	11.219	

Material : A500 GrC rectangular

Properties	Unit	Value
Yield stress (Fy):	[Kip/in2]	50.00
Tensile strength (Fu):	[Kip/in2]	62.00
Elasticity Modulus (E):	[Kip/in2]	29000.00
Shear modulus for steel (G):	[Kip/in2]	11153.85

Design Criteria

Description	Unit	Value
Length for tension slenderness ratio (L)	[ft]	4.82

Distance between member lateral bracing points

Length (Lb) [ft] Top	Bottom
4.82	4.82

Laterally unbraced length

Length [ft] Major axis(L33)	Minor axis(L22)	Torsional axis(Lt)	Effective length factor Major axis(K33)	Minor axis(K22)	Torsional axis(Kt)
4.82	4.82	4.82	1.0	1.0	1.0

Additional assumptions

Continuous lateral torsional restraint	No
Tension field action	No
Continuous flexural torsional restraint	No
Effective length factor value type	None
Major axis frame type	Sway
Minor axis frame type	Sway

Design Checks

Axial Tension Design ✓

Axial tension

Ratio	:	0.17			
Capacity	:	137.63 [Kip]	Reference	:	Cl.D2
Demand	:	23.68 [Kip]	Ctrl Eq.	:	C82 at 50.00%

Intermediate results	Unit	Value	Reference
Factored axial tension capacity (P_n/Ω):	[Kip]	137.63	Cl.D2
Nominal axial tension capacity (P_n)	[Kip]	229.85	Eq.D2-1

Axial Compression Design ✓

Compression in the major axis 33

Ratio	:	0.42			
Capacity	:	128.79 [Kip]	Reference	:	Cl.E3
Demand	:	53.85 [Kip]	Ctrl Eq.	:	C12 at 0.00%

Intermediate results	Unit	Value	Reference
Section classification			
Unstiffened element classification	--	Non slender	
Unstiffened element slenderness (λ)	--	17.00	
Unstiffened element limiting slenderness (λ_r)	--	33.72	Table.B4.1a.Case6
Stiffened element classification	--	Non slender	
Stiffened element slenderness (λ)	--	17.00	
Stiffened element limiting slenderness (λ_r)	--	33.72	Table.B4.1a.Case6
Factored flexural buckling strength (P_{n33}/Ω):	[Kip]	128.79	Cl.E3
Effective length (KL_{33})	[ft]	4.82	Cl.E2
Effective slenderness ($(KL/r)_{33}$)	--	30.13	Cl.E2
Elastic critical buckling stress (F_{e33})	[Kip/in2]	315.30	Eq.E3-4
Effective area of the cross section based on the effective width (A_{eff33})	[in2]	4.60	
Critical stress for flexural buckling (F_{cr33})	[Kip/in2]	46.79	Eq.E3-2
Nominal flexural buckling strength (P_{n33})	[Kip]	215.09	Eq.E3-1

Compression in the minor axis 22

Ratio	: 0.42			
Capacity	: 128.79 [Kip]	Reference	: Cl.E3	
Demand	: 53.85 [Kip]	Ctrl Eq.	: C12 at 0.00%	

Intermediate results	Unit	Value	Reference
Section classification			
Unstiffened element classification	--	Non slender	
Unstiffened element slenderness (λ)	--	17.00	
Unstiffened element limiting slenderness (λ_r)	--	33.72	Table.B4.1a.Case6
Stiffened element classification	--	Non slender	
Stiffened element slenderness (λ)	--	17.00	
Stiffened element limiting slenderness (λ_r)	--	33.72	Table.B4.1a.Case6
Factored flexural buckling strength (P_{n22}/Ω):	[Kip]	128.79	Cl.E3
Effective length (KL 22)	[ft]	4.82	Cl.E2
Effective slenderness ((KL/r) 22)	--	30.13	Cl.E2
Elastic critical buckling stress (F_{e22})	[Kip/in2]	315.30	Eq.E3-4
Effective area of the cross section based on the effective width (A_{eff22})	[in2]	4.60	
Critical stress for flexural buckling (F_{cr22})	[Kip/in2]	46.79	Eq.E3-2
Nominal flexural buckling strength (P_{n22})	[Kip]	215.09	Eq.E3-1

Flexural Design ✔

Bending about major axis, M33

Ratio	: 0.16			
Capacity	: 20.18 [Kip*ft]	Reference	: Cl.F7.1	
Demand	: 3.21 [Kip*ft]	Ctrl Eq.	: C78 at 0.00%	

Intermediate results	Unit	Value	Reference
Section classification			
Unstiffened element classification	--	Compact	
Unstiffened element slenderness (λ)	--	17.00	
Limiting slenderness for noncompact unstiffened element (λ_r)	--	33.72	
Limiting slenderness for compact unstiffened element (λ_p)	--	26.97	
Stiffened element classification	--	Compact	
Stiffened element slenderness (λ)	--	17.00	
Limiting slenderness for noncompact stiffened element (λ_r)	--	137.27	
Limiting slenderness for compact stiffened element (λ_p)	--	58.28	
Factored yielding strength (M_n/Ω):	[Kip*ft]	20.18	Cl.F7.1
Yielding (M_n)	[Kip*ft]	33.69	Eq.F7-1

Bending about minor axis, M22

Ratio	: 0.10			
Capacity	: 20.18 [Kip*ft]	Reference	: Cl.F7.1	
Demand	: 2.11 [Kip*ft]	Ctrl Eq.	: C87 at 0.00%	

Intermediate results	Unit	Value	Reference
Section classification			
Unstiffened element classification	--	Compact	
Unstiffened element slenderness (λ)	--	17.00	
Limiting slenderness for noncompact unstiffened element (λ_r)	--	33.72	
Limiting slenderness for compact unstiffened element (λ_p)	--	26.97	
Stiffened element classification	--	Compact	
Stiffened element slenderness (λ)	--	17.00	
Limiting slenderness for noncompact stiffened element (λ_r)	--	137.27	
Limiting slenderness for compact stiffened element (λ_p)	--	58.28	
Factored yielding strength about a geometric axis (M_n/Ω):	[Kip*ft]	20.18	Cl.F7.1
Yielding (M_n)	[Kip*ft]	33.69	Eq.F7-1

Shear Design ✔

Shear in major axis 33

Ratio	:	0.00		
Capacity	:	38.17 [Kip]	Reference	: Cl.G1
Demand	:	0.06 [Kip]	Ctrl Eq.	: C87 at 50.00%

Intermediate results	Unit	Value	Reference
Factored shear capacity (V_n/Ω):	[Kip]	38.17	Cl.G1
Web buckling coefficient (k_v)	--	5.00	Cl.G4
Web buckling coefficient (C_v)	--	1.00	Eq.G2-9
Nominal shear strength (V_n)	[Kip]	63.75	Eq.G4-1

Shear in minor axis 22

Ratio	:	0.03		
Capacity	:	38.17 [Kip]	Reference	: Cl.G1
Demand	:	1.30 [Kip]	Ctrl Eq.	: C64 at 50.00%

Intermediate results	Unit	Value	Reference
Factored shear capacity (V_n/Ω):	[Kip]	38.17	Cl.G1
Web buckling coefficient (k_v)	--	5.00	Cl.G4
Web buckling coefficient (C_v)	--	1.00	Eq.G2-9
Nominal shear strength (V_n)	[Kip]	63.75	Eq.G4-1

Torsion Design ✔

Torsion

Ratio	:	0.00		
Capacity	:	16.80 [Kip*ft]	Reference	: Cl.H3.1
Demand	:	0.07 [Kip*ft]	Ctrl Eq.	: C87 at 0.00%

Intermediate results	Unit	Value	Reference
Factored torsion capacity (T_n/Ω):	[Kip*ft]	16.80	Cl.H3.1
Critical torsional buckling stress (F_{cr})	[Kip/in2]	30.00	Eq.H3-3
Nominal torsion capacity (T_n)	[Kip*ft]	28.05	Eq.H3-1

Combined Actions Design ✔

Combined flexure and axial

Ratio	:	0.53		
Ctrl Eq.	:	C12 at 0.00%	Reference	: Eq.H1-1a

Intermediate results	Unit	Value	Reference
Interaction of flexure and axial force :	--	0.53	Eq.H1-1a
Available flexural strength about strong axis (M_{c33})	[Kip*ft]	20.18	Cl.H1.1
Available flexural strength about weak axis (M_{c22})	[Kip*ft]	20.18	Cl.H1.1
Available axial strength (P_c)	[Kip]	128.79	Cl.H1.1

RAM Elements

Current Date: 6/4/2025 5:30 PM
Units system: English

Steel Code Check
Comprehensive Report

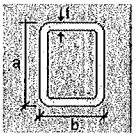
AISC 360-2016 ASD (Hot-rolled)

Member : 54 (Web) - OK

Section information

Section name: HSS_RECT 4X4X7ga **(US)**

Dimensions



a	=	4.000	[in]	Height
b	=	4.000	[in]	Width
T	=	0.188	[in]	Thickness

Properties	Unit	Major axis	Minor axis
Gross area of the section. (Ag)	[in2]	2.780	
Moment of Inertia (local axes) (I)	[in4]	6.614	6.614
Moment of Inertia (principal axes) (I')	[in4]	6.614	6.614
Bending constant for moments (principal axis) (J')	[in]	0.000	0.000
Radius of gyration (local axes) (r)	[in]	1.542	1.542
Radius of gyration (principal axes) (r')	[in]	1.542	1.542
Saint-Venant torsion constant. (J)	[in4]	10.635	
Section warping constant. (Cw)	[in6]	0.027	
Distance from centroid to shear center (principal axis) (xo,yo)	[in]	0.000	0.000
Top elastic section modulus of the section (local axis) (Ssup)	[in3]	3.307	3.307
Bottom elastic section modulus of the section (local axis) (Sinf)	[in3]	3.307	3.307
Top elastic section modulus of the section (principal axis) (S'sup)	[in3]	3.307	3.307
Bottom elastic section modulus of the section (principal axis) (S'inf)	[in3]	3.307	3.307
Plastic section modulus (local axis) (Z)	[in3]	3.928	3.928
Plastic section modulus (principal axis) (Z')	[in3]	3.928	3.928
Polar radius of gyration. (ro)	[in]	2.181	
Area for shear (Aw)	[in2]	1.292	1.292
Torsional constant. (C)	[in3]	5.437	

Material : A500 GrC rectangular

Properties	Unit	Value
Yield stress (Fy):	[Kip/in2]	50.00
Tensile strength (Fu):	[Kip/in2]	62.00
Elasticity Modulus (E):	[Kip/in2]	29000.00
Shear modulus for steel (G):	[Kip/in2]	11153.85

Design Criteria

Description	Unit	Value
Length for tension slenderness ratio (L)	[ft]	4.25

Distance between member lateral bracing points

Length (Lb) [ft] Top	Bottom
4.25	4.25

Laterally unbraced length

Length [ft] Major axis(L33)	Minor axis(L22)	Torsional axis(Lt)	Effective length factor Major axis(K33)	Minor axis(K22)	Torsional axis(Kt)
4.25	4.25	4.25	1.0	1.0	1.0

Additional assumptions

Continuous lateral torsional restraint	No
Tension field action	No
Continuous flexural torsional restraint	No
Effective length factor value type	None
Major axis frame type	Sway
Minor axis frame type	Sway

Design Checks

Axial Tension Design ✔

Axial tension

Ratio	:	0.09			
Capacity	:	83.24 [Kip]	Reference	:	Cl.D2
Demand	:	7.18 [Kip]	Ctrl Eq.	:	C62 at 100.00%

Intermediate results	Unit	Value	Reference
Factored axial tension capacity (P_n/Ω):	[Kip]	83.24	Cl.D2
Nominal axial tension capacity (P_n)	[Kip]	139.00	Eq.D2-1

Axial Compression Design ✔

Compression in the major axis 33

Ratio	:	0.23			
Capacity	:	76.84 [Kip]	Reference	:	Cl.E3
Demand	:	17.98 [Kip]	Ctrl Eq.	:	C32 at 0.00%

Intermediate results	Unit	Value	Reference
Section classification			
Unstiffened element classification	--	Non slender	
Unstiffened element slenderness (λ)	--	18.28	
Unstiffened element limiting slenderness (λ_r)	--	33.72	Table.B4.1a.Case6
Stiffened element classification	--	Non slender	
Stiffened element slenderness (λ)	--	18.28	
Stiffened element limiting slenderness (λ_r)	--	33.72	Table.B4.1a.Case6
Factored flexural buckling strength (P_{n33}/Ω):	[Kip]	76.84	Cl.E3
Effective length (KL_{33})	[ft]	4.25	Cl.E2
Effective slenderness ($(KL/r)_{33}$)	--	33.05	Cl.E2
Elastic critical buckling stress (F_{e33})	[Kip/in2]	261.95	Eq.E3-4
Effective area of the cross section based on the effective width (A_{eff33})	[in2]	2.78	
Critical stress for flexural buckling (F_{cr33})	[Kip/in2]	46.16	Eq.E3-2
Nominal flexural buckling strength (P_{n33})	[Kip]	128.33	Eq.E3-1

Compression in the minor axis 22

Ratio	:	0.23			
Capacity	:	76.84 [Kip]	Reference	:	Cl.E3
Demand	:	17.98 [Kip]	Ctrl Eq.	:	C32 at 0.00%

Intermediate results	Unit	Value	Reference
Section classification			
Unstiffened element classification	--	Non slender	
Unstiffened element slenderness (λ)	--	18.28	
Unstiffened element limiting slenderness (λ_r)	--	33.72	Table.B4.1a.Case6
Stiffened element classification	--	Non slender	
Stiffened element slenderness (λ)	--	18.28	
Stiffened element limiting slenderness (λ_r)	--	33.72	Table.B4.1a.Case6
Factored flexural buckling strength (P_{n22}/Ω):	[Kip]	76.84	Cl.E3
Effective length (KL 22)	[ft]	4.25	Cl.E2
Effective slenderness ((KL/r) 22)	--	33.05	Cl.E2
Elastic critical buckling stress (F_{e22})	[Kip/in2]	261.95	Eq.E3-4
Effective area of the cross section based on the effective width (A_{eff22})	[in2]	2.78	
Critical stress for flexural buckling (F_{cr22})	[Kip/in2]	46.16	Eq.E3-2
Nominal flexural buckling strength (P_{n22})	[Kip]	128.33	Eq.E3-1

Flexural Design ✔

Bending about major axis, M33

Ratio	:	0.06			
Capacity	:	9.80 [Kip*ft]	Reference	:	Cl.F7.1
Demand	:	0.56 [Kip*ft]	Ctrl Eq.	:	C12 at 0.00%

Intermediate results	Unit	Value	Reference
Section classification			
Unstiffened element classification	--	Compact	
Unstiffened element slenderness (λ)	--	18.28	
Limiting slenderness for noncompact unstiffened element (λ_r)	--	33.72	
Limiting slenderness for compact unstiffened element (λ_p)	--	26.97	
Stiffened element classification	--	Compact	
Stiffened element slenderness (λ)	--	18.28	
Limiting slenderness for noncompact stiffened element (λ_r)	--	137.27	
Limiting slenderness for compact stiffened element (λ_p)	--	58.28	
Factored yielding strength (M_n/Ω):	[Kip*ft]	9.80	Cl.F7.1
Yielding (M_n)	[Kip*ft]	16.37	Eq.F7-1

Bending about minor axis, M22

Ratio	:	0.04			
Capacity	:	9.80 [Kip*ft]	Reference	:	Cl.F7.1
Demand	:	-0.36 [Kip*ft]	Ctrl Eq.	:	C87 at 0.00%

Intermediate results	Unit	Value	Reference
Section classification			
Unstiffened element classification	--	Compact	
Unstiffened element slenderness (λ)	--	18.28	
Limiting slenderness for noncompact unstiffened element (λ_r)	--	33.72	
Limiting slenderness for compact unstiffened element (λ_p)	--	26.97	
Stiffened element classification	--	Compact	
Stiffened element slenderness (λ)	--	18.28	
Limiting slenderness for noncompact stiffened element (λ_r)	--	137.27	
Limiting slenderness for compact stiffened element (λ_p)	--	58.28	
Factored yielding strength about a geometric axis (M_n/Ω):	[Kip*ft]	9.80	Cl.F7.1
Yielding (M_n)	[Kip*ft]	16.37	Eq.F7-1

Shear Design ✔

Shear in major axis 33

Ratio	:	0.00			
Capacity	:	23.21 [Kip]	Reference	:	Cl.G1
Demand	:	0.04 [Kip]	Ctrl Eq.	:	C87 at 0.00%

Intermediate results	Unit	Value	Reference
Factored shear capacity (V_n/Ω):	[Kip]	23.21	Cl.G1
Web buckling coefficient (k_v)	--	5.00	Cl.G4
Web buckling coefficient (C_v)	--	1.00	Eq.G2-9
Nominal shear strength (V_n)	[Kip]	38.76	Eq.G4-1

Shear in minor axis 22

Ratio	:	0.01			
Capacity	:	23.21 [Kip]	Reference	:	Cl.G1
Demand	:	0.27 [Kip]	Ctrl Eq.	:	C12 at 100.00%

Intermediate results	Unit	Value	Reference
Factored shear capacity (V_n/Ω):	[Kip]	23.21	Cl.G1
Web buckling coefficient (k_v)	--	5.00	Cl.G4
Web buckling coefficient (C_v)	--	1.00	Eq.G2-9
Nominal shear strength (V_n)	[Kip]	38.76	Eq.G4-1

Torsion Design ✔

Torsion

Ratio	:	0.03			
Capacity	:	8.14 [Kip*ft]	Reference	:	Cl.H3.1
Demand	:	0.23 [Kip*ft]	Ctrl Eq.	:	C87 at 0.00%

Intermediate results	Unit	Value	Reference
Factored torsion capacity (T_n/Ω):	[Kip*ft]	8.14	Cl.H3.1
Critical torsional buckling stress (F_{cr})	[Kip/in2]	30.00	Eq.H3-3
Nominal torsion capacity (T_n)	[Kip*ft]	13.59	Eq.H3-1

Combined Actions Design ✔

Combined flexure and axial

Ratio	:	0.27			
Ctrl Eq.	:	C32 at 100.00%	Reference	:	Eq.H1-1a

Intermediate results	Unit	Value	Reference
Interaction of flexure and axial force :	--	0.27	Eq.H1-1a
Available flexural strength about strong axis (M_{c33})	[Kip*ft]	9.80	Cl.H1.1
Available flexural strength about weak axis (M_{c22})	[Kip*ft]	9.80	Cl.H1.1
Available axial strength (P_c)	[Kip]	76.84	Cl.H1.1

RAM Elements

Current Date: 6/4/2025 5:30 PM
Units system: English

Steel Code Check
Comprehensive Report

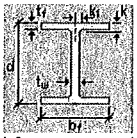
AISC 360-2016 ASD (Hot-rolled)

Member : 1 (Post) - OK

Section information

Section name: W 16 X 67 **(US)**

Dimensions



bf	=	10.200	[in]	Width
d	=	16.300	[in]	Depth
k	=	1.070	[in]	Distance k
k1	=	1.000	[in]	Distance k1
tf	=	0.665	[in]	Flange thickness
tw	=	0.395	[in]	Web thickness

Properties	Unit	Major axis	Minor axis
Gross area of the section. (Ag)	[in2]	19.742	
Moment of Inertia (local axes) (I)	[in4]	955.371	117.698
Moment of Inertia (principal axes) (I')	[in4]	955.371	117.698
Bending constant for moments (principal axis) (J')	[in]	0.000	0.000
Radius of gyration (local axes) (r)	[in]	6.957	2.442
Radius of gyration (principal axes) (r')	[in]	6.957	2.442
Saint-Venant torsion constant. (J)	[in4]	2.321	
Section warping constant. (Cw)	[in6]	7187.977	
Distance from centroid to shear center (principal axis) (xo,yo)	[in]	0.000	0.000
Top elastic section modulus of the section (local axis) (Ssup)	[in3]	117.223	23.078
Bottom elastic section modulus of the section (local axis) (Sinf)	[in3]	117.223	23.078
Top elastic section modulus of the section (principal axis) (S'sup)	[in3]	117.223	23.078
Bottom elastic section modulus of the section (principal axis) (S'inf)	[in3]	117.223	23.078
Plastic section modulus (local axis) (Z)	[in3]	130.192	34.593
Plastic section modulus (principal axis) (Z')	[in3]	130.192	34.593
Polar radius of gyration. (ro)	[in]	7.373	
Area for shear (Aw)	[in2]	13.566	6.176
Torsional constant. (C)	[in3]	3.490	

Material : A992 Gr50

Properties	Unit	Value
Yield stress (Fy):	[Kip/in2]	50.00
Tensile strength (Fu):	[Kip/in2]	65.00
Elasticity Modulus (E):	[Kip/in2]	29000.00
Shear modulus for steel (G):	[Kip/in2]	11153.85

Design Criteria

Description	Unit	Value
Length for tension slenderness ratio (L)	[ft]	11.91

Distance between member lateral bracing points

Length (Lb) [ft]	
Top	Bottom
11.91	11.91

Laterally unbraced length

Length [ft]			Effective length factor		
Major axis(L33)	Minor axis(L22)	Torsional axis(Lt)	Major axis(K33)	Minor axis(K22)	Torsional axis(Kt)
11.91	16.33	11.91	2.00	2.00	1.0

Additional assumptions

Continuous lateral torsional restraint	No
Tension field action	No
Continuous flexural torsional restraint	No
Effective length factor value type	None
Major axis frame type	Sway
Minor axis frame type	Sway

Design Checks

Axial Tension Design ✔

Axial tension

Ratio	:	0.02			
Capacity	:	591.07 [Kip]	Reference	:	Cl.D2
Demand	:	12.72 [Kip]	Ctrl Eq.	:	C82 at 100.00%

Intermediate results	Unit	Value	Reference
Factored axial tension capacity (P_n/Ω):	[Kip]	591.07	Cl.D2
Nominal axial tension capacity (P_n)	[Kip]	987.09	Eq.D2-1

Axial Compression Design ✔

Compression in the major axis 33

Ratio	:	0.09			
Capacity	:	522.41 [Kip]	Reference	:	Cl.E3
Demand	:	48.98 [Kip]	Ctrl Eq.	:	C15 at 0.00%

Intermediate results	Unit	Value	Reference
Section classification			
Unstiffened element classification	--	Non slender	
Unstiffened element slenderness (λ)	--	7.67	
Unstiffened element limiting slenderness (λ_r)	--	13.49	Table.B4.1a.Case1
Stiffened element classification	--	Non slender	
Stiffened element slenderness (λ)	--	35.85	
Stiffened element limiting slenderness (λ_r)	--	35.88	Table.B4.1a.Case5
Factored flexural buckling strength (P_{n33}/Ω):	[Kip]	522.41	Cl.E3
Effective length (KL 33)	[ft]	23.82	Cl.E2
Effective slenderness ((KL/r) 33)	--	41.10	Cl.E2
Elastic critical buckling stress (F_{e33})	[Kip/in2]	169.48	Eq.E3-4
Effective area of the cross section based on the effective width (A_{eff33})	[in2]	19.74	
Critical stress for flexural buckling (F_{cr33})	[Kip/in2]	44.19	Eq.E3-2
Nominal flexural buckling strength (P_{n33})	[Kip]	872.43	Eq.E3-1

Compression in the minor axis 22

Ratio	: 0.43		
Capacity	: 115.13 [Kip]	Reference	: Cl.E3
Demand	: 48.98 [Kip]	Ctrl Eq.	: C15 at 0.00%

Intermediate results	Unit	Value	Reference
Section classification			
Unstiffened element classification	--	Non slender	
Unstiffened element slenderness (λ)	--	7.67	
Unstiffened element limiting slenderness (λ_r)	--	13.49	Table.B4.1a.Case1
Stiffened element classification	--	Non slender	
Stiffened element slenderness (λ)	--	35.85	
Stiffened element limiting slenderness (λ_r)	--	35.88	Table.B4.1a.Case5
Factored flexural buckling strength (P_{n22}/Ω):	[Kip]	115.13	Cl.E3
Effective length (KL 22)	[ft]	32.67	Cl.E2
Effective slenderness ((KL/r) 22)	--	160.54	Cl.E2
Elastic critical buckling stress (F_{e22})	[Kip/in2]	11.11	Eq.E3-4
Effective area of the cross section based on the effective width (A_{eff22})	[in2]	19.74	
Critical stress for flexural buckling (F_{cr22})	[Kip/in2]	9.74	Eq.E3-3
Nominal flexural buckling strength (P_{n22})	[Kip]	192.27	Eq.E3-1
Factored torsional or flexural-torsional buckling strength (P_{n11}/Ω):	[Kip]	494.99	Cl.E4
Effective length (KL 11)	[ft]	11.91	Cl.E2
Torsional or flexural-torsional elastic buckling stress (F_{e11})	[Kip/in2]	117.96	Eq.E4-2
Effective area of the cross section based on the effective width (A_{eff11})	[in2]	19.74	
Critical stress for torsional or flexural-torsional buckling (F_{cr11})	[Kip/in2]	41.87	Eq.E3-2
Nominal torsional or flexural-torsional buckling strength (P_{n11})	[Kip]	826.63	Eq.E4-1

Flexural Design ✓

Bending about major axis, M33

Ratio	: 0.47		
Capacity	: 314.83 [Kip*ft]	Reference	: Cl.F2.2
Demand	: 146.82 [Kip*ft]	Ctrl Eq.	: C64 at 0.00%

Intermediate results	Unit	Value	Reference
Section classification			
Unstiffened element classification	--	Compact	
Unstiffened element slenderness (λ)	--	7.67	
Limiting slenderness for noncompact unstiffened element (λ_r)	--	24.08	
Limiting slenderness for compact unstiffened element (λ_p)	--	9.15	
Stiffened element classification	--	Compact	
Stiffened element slenderness (λ)	--	35.85	
Limiting slenderness for noncompact stiffened element (λ_r)	--	137.27	
Limiting slenderness for compact stiffened element (λ_p)	--	90.55	
Factored yielding strength (M_n/Ω):	[Kip*ft]	324.83	Cl.F2.1
Yielding (M_n)	[Kip*ft]	542.47	Eq.F2-1
Factored lateral-torsional buckling strength (M_n/Ω):	[Kip*ft]	314.83	Cl.F2.2
Limiting laterally unbraced length for yielding (L_p)	[ft]	8.62	Eq.F2-5
Effective radius of gyration used in the determination of Lr (r_{ts})	[in]	2.80	Eq.F2-7
Lateral-torsional factor (c)	--	1.00	Eq.F2-8a
Limiting laterally unbraced length for inelastic lateral-torsional buckling (L_r)	[ft]	25.72	Eq.F2-6
Lateral-torsional buckling modification factor (C_b)	--	1.04	Eq.F1-1
Nominal lateral-torsional buckling moment strength (M_n)	[Kip*ft]	525.76	Eq.F2-2

Bending about minor axis, M22

Ratio	: 0.16		
Capacity	: 86.31 [Kip*ft]	Reference	: Cl.F6.1
Demand	: 13.94 [Kip*ft]	Ctrl Eq.	: C87 at 0.00%

Intermediate results	Unit	Value	Reference
Section classification			
Unstiffened element classification	--	Compact	
Unstiffened element slenderness (λ)	--	7.67	
Limiting slenderness for noncompact unstiffened element (λ_r)	--	24.08	
Limiting slenderness for compact unstiffened element (λ_p)	--	9.15	
Stiffened element classification	--	Compact	
Stiffened element slenderness (λ)	--	35.85	
Limiting slenderness for noncompact stiffened element (λ_r)	--	137.27	
Limiting slenderness for compact stiffened element (λ_p)	--	90.55	
Factored yielding strength about a geometric axis (M_n/Ω):	[Kip*ft]	86.31	Cl.F6.1
Yielding (M_n)	[Kip*ft]	144.14	Eq.F6-1

Shear Design ✔

Shear in major axis 33

Ratio	:	0.00		
Capacity	:	243.70 [Kip]	Reference	: Cl.G1
Demand	:	0.88 [Kip]	Ctrl Eq.	: C87 at 0.00%

Intermediate results	Unit	Value	Reference
Factored shear capacity (V_n/Ω):	[Kip]	243.70	Cl.G1
Web buckling coefficient (k_v)	--	1.20	Cl.G6
Web buckling coefficient (C_v)	--	1.00	Eq.G2-9
Nominal shear strength (V_n)	[Kip]	406.98	Eq.G6-1

Shear in minor axis 22

Ratio	:	0.02		
Capacity	:	123.52 [Kip]	Reference	: Cl.G1
Demand	:	2.48 [Kip]	Ctrl Eq.	: C43 at 0.00%

Intermediate results	Unit	Value	Reference
Factored shear capacity (V_n/Ω):	[Kip]	123.52	Cl.G1
Web buckling coefficient (k_v)	--	5.34	Eq.G2-5
Web buckling coefficient (C_v)	--	1.00	-
Nominal shear strength (V_n)	[Kip]	185.27	Eq.G2-1

Combined Actions Design ✔

Combined flexure and axial

Ratio	:	0.65		
Ctrl Eq.	:	C12 at 0.00%	Reference	: Eq.H1-3b

Intermediate results	Unit	Value	Reference
Interaction for doubly symmetric members for in-plane bending :	--	0.37	Eq.H1-3a(H1-1b)
In-plane available flexural strength (M_{c33})	[Kip*ft]	324.83	Cl.H1.3
In-plane available axial compressive strength (P_c)	[Kip]	522.41	Cl.H1.3
Interaction for doubly symmetric members for out-of-plane bending :	--	0.65	Eq.H1-3b
Out-of-plane available flexural-torsional strength (M_{c33})	[Kip*ft]	301.74	Cl.H1.3
Out-of-plane available axial compressive strength (P_{co})	[Kip]	115.13	Cl.H1.3

RAM Elements

Current Date: 6/4/2025 5:49 PM
Units system: English

Steel Code Check
Comprehensive Report

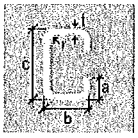
AISI 2016 ASD (Cold-formed)

Member : 2 (Purlin) - OK

Section information

Section name: aisiCS 8x3.5x12ga **(US)**

Dimensions



a	=	1.000	[in]	Lip
b	=	3.500	[in]	Flange width
c	=	8.000	[in]	Depth
r	=	0.250	[in]	Inside bend radius
t	=	0.109	[in]	Thickness

Properties	Unit	Major axis	Minor axis
Gross area of the section. (Ag)	[in2]	1.743	
Moment of Inertia (local axes) (I)	[in4]	17.469	2.876
Moment of Inertia (principal axes) (I')	[in4]	17.469	2.876
Bending constant for moments (principal axis) (J')	[in]	0.000	4.679
Radius of gyration (local axes) (r)	[in]	3.166	1.284
Radius of gyration (principal axes) (r')	[in]	3.166	1.284
Saint-Venant torsion constant. (J)	[in4]	0.007	
Section warping constant. (Cw)	[in6]	41.674	
Distance from centroid to shear center (principal axis) (xo,yo)	[in]	-2.848	0.000
Top elastic section modulus of the section (local axis) (Ssup)	[in3]	4.367	1.205
Bottom elastic section modulus of the section (local axis) (Sinf)	[in3]	4.367	2.582
Top elastic section modulus of the section (principal axis) (S'sup)	[in3]	4.367	1.205
Bottom elastic section modulus of the section (principal axis) (S'inf)	[in3]	4.367	2.582
Plastic section modulus (local axis) (Z)	[in3]	5.079	1.834
Plastic section modulus (principal axis) (Z')	[in3]	5.079	1.834
Polar radius of gyration. (ro)	[in]	4.448	
Area for shear (Aw)	[in2]	0.739	1.066
Torsional constant. (C)	[in3]	0.066	

Material : A 570 GR 80

Properties	Unit	Value
Yield stress (Fy):	[Kip/in2]	80.00
Tensile strength (Fu):	[Kip/in2]	60.00
Elasticity Modulus (E):	[Kip/in2]	29000.00
Shear modulus for steel (G):	[Kip/in2]	11153.85

Design Criteria

Description	Unit	Major axis	Minor axis

Additional hypotheses

Full lateral restraints	No
Continuous flexural torsional restraint	No
Local axis design	No
Region between inflection points adjacent to support	No
Span type	Simple
Fastened to support	Unfastened
Local shear	No
Braced for sidesway in major axis	No
Braced for sidesway in minor axis	No
Loading condition	EOF
Flange support condition	Fastened

Member lateral unbraced lengths

Length (Lb) [ft]		Restraint arrangement		Rotation restraint	
Top	Bottom	Top	Bottom	Top	Bottom
0.10	6.75	FF	FF	None	None

Compression member unbraced lengths

Length (L) [ft]			Effective length factor (ke)		
Major axis	Minor axis		Major axis	Minor axis	
27.00	27.00	23.67	0.00	0.00	1.0

Design Checks

Axial Tension Design ✔

Axial tension

Ratio	:	0.00			
Capacity	:	52.30 [Kip]	Reference	:	Sec. D3
Demand	:	0.00 [Kip]	Ctrl Eq.	:	C1 at 0.00%

Intermediate results	Unit	Value	Reference
Factored axial tension capacity (P_n/Ω):	[Kip]	83.51	Sec. D2
Nominal axial tension capacity (P_n)	[Kip]	139.45	Eq. D2-1
Factored axial tensile fracture capacity (P_n/Ω):	[Kip]	52.30	Sec. D3
Net area of the cross section (A_n)	[in2]	1.74	
Nominal axial tensile fracture capacity (P_n)	[Kip]	104.59	Eq. D3-1

Shear Design ✔

Shear in major axis 33

Ratio	:	0.00			
Capacity	:	18.19 [Kip]	Reference	:	Sec. G2
Demand	:	0.00 [Kip]	Ctrl Eq.	:	C1 at 0.00%

Intermediate results	Unit	Value	Reference
Factored shear capacity (V_n/Ω):	[Kip]	18.19	Sec. G2
Shear area (A_w)	[in2]	0.61	
Web height under shear (h_w)	[ft]	0.23	
Web buckling coefficient (k_v)	--	5.34	Sec. G2
Nominal shear stress (F_v)	[Kip/in2]	48.00	Eq. G2.1-2a
Nominal shear strength (V_n)	[Kip]	29.11	Eq. G2.1-1

Shear in minor axis 22

Ratio	:	0.10			
Capacity	:	15.56 [Kip]	Reference	:	Sec. G2
Demand	:	1.60 [Kip]	Ctrl Eq.	:	C12 at 0.00%

Intermediate results	Unit	Value	Reference
Factored shear capacity (V_n/Ω):	[Kip]	15.56	Sec. G2
Shear area (A_w)	[in2]	0.79	
Web height under shear (h_w)	[ft]	0.61	
Web buckling coefficient (k_v)	--	5.34	Sec. G2
Nominal shear stress (F_v)	[Kip/in2]	31.37	Eq. G2.1-4
Nominal shear strength (V_n)	[Kip]	24.90	Eq. G2.1-1

Axial Compression Design ✔

Axial compression

Ratio	:	0.00			
Capacity	:	3.82 [Kip]	Reference	:	Sec. E2
Demand	:	0.00 [Kip]	Ctrl Eq.	:	C1 at 0.00%

Intermediate results	Unit	Value	Reference
Factored axial compression capacity (P_n/Ω):	[Kip]	3.82	Sec. E2
Effective length factor (major principal axis) (K_x)	--	1.00	
Effective length factor (minor principal axis) (K_y)	--	1.00	
Laterally unbraced length (major principal axis) (L_x)	[ft]	27.00	
Laterally unbraced length (minor principal axis) (L_y)	[ft]	27.00	
Effective slenderness ratio (major principal axis) (λ_x)	--	102.35	
Effective slenderness ratio (minor principal axis) (λ_y)	--	252.25	
Elastic flexural buckling stress (major principal axis) (F_{ex})	[Kip/in2]	27.32	Eq. E2.1-1
Elastic flexural buckling stress (minor principal axis) (F_{ey})	[Kip/in2]	4.50	Eq. E2.1-1
Effective length factor in longitudinal axis (K_z)	--	1.00	
Laterally unbraced length in longitudinal axis (L_z)	[ft]	23.67	
Elastic flexural buckling stress (major principal axis) (σ_x)	[Kip/in2]	27.32	Eq. F2.1.1-4
Coefficient beta (β_{Fe})	--	0.59	Eq. E2.2-3
Elastic torsional buckling stress (major principal axis) (σ_t)	[Kip/in2]	6.60	Eq. E2.2-5
Elastic torsional or flexural-torsional buckling stress (F_{et})	[Kip/in2]	5.93	Eq. E2.2-1
Nominal buckling stress (F_n)	[Kip/in2]	3.94	Eq. E2-3
Coefficient Lambda (λ_c)	--	4.22	Eq. E2-4
Nominal axial compression capacity (P_n)	[Kip]	6.88	Eq. E2-1
Factored axial compression distortional buckling capacity (P_n/Ω):	[Kip]	45.57	Sec. E4
Member yield strength for distortional buckling (P_y)	[Kip]	139.45	Eq. E4.1-4
Rotational stiffness provided by the bracing system (flange/web) (K_{phi})	--	0.00	
Critical member length for distortional buckling (L_{cr})	[ft]	2.42	Eq. Ap2.3.1.3-7
Unbraced length to restrain distortional buckling (L_m)	[ft]	23.67	
Minimum of Lcr and Lm (L_{min})	[ft]	2.42	Sec. E4
Elastic rotational stiffness provided by the flange (flange/web) (K_{phife})	--	1.10	Eq. Ap2.3.1.3-3
Elastic rotational stiffness provided by the web (flange/web) (K_{phiwe})	--	0.86	Eq. Ap2.3.1.3-4
Geometric rotational stiffness by the web (flange/web) (K_{phiwg})	--	0.00	Eq. Ap2.3.1.3-6
Distortional buckling stress (F_d)	[Kip/in2]	45.90	Eq. Ap2.3.1.3-2
Distortional buckling load (P_{crd})	[Kip]	80.00	Eq. Ap2.3.1.3-1
Slenderness ratio (λ_d)	--	1.32	Eq. E4.1-3
Nominal axial compression distortional buckling capacity (P_n)	[Kip]	82.02	Eq. E4.1-2
Factored local buckling strength (P_n/Ω):	[Kip]	3.82	Sec. E3
Effective area at stress Fn (A_e)	[in2]	1.74	
Local buckling (P_n)	[Kip]	6.88	Sec. E3.1-1

Flexural Design ✔

Bending about major axis, M33

Ratio	:	0.70			
Capacity	:	8.30 [Kip*ft]	Reference	:	Sec. F3
Demand	:	-5.79 [Kip*ft]	Ctrl Eq.	:	C12 at 0.00%

Intermediate results	Unit	Value	Reference
Factored section moment capacity (M_n/Ω):	[Kip*ft]	17.43	Sec. F2
Elastic section modulus of full unreduced section relative to extreme com...	[in3]	4.37	Sec. F2
Nominal section moment capacity (M_n)	[Kip*ft]	29.12	Eq. C3.1.1-1
Factored lateral-torsional buckling strength (M_n/Ω):	[Kip*ft]	8.43	Sec. F2
Lateral-torsional buckling modification factor (C_b)	--	1.00	Eq. F2.1.1-2
Polar radius of gyration of cross-section about shear center (r_o)	[in]	4.45	
Effective length factor (K_y)	--	1.00	
Unbraced length (L_y)	[ft]	6.75	
Elastic flexural buckling stress (major principal axis) (σ_{ey})	[Kip/in2]	71.97	Eq. F2.1.1-4
Elastic torsional buckling stress (major principal axis) (σ_t)	[Kip/in2]	6.60	Eq. E2.2-5
Effective length factor for torsional buckling (K_t)	--	1.00	
Torsional unbraced length (L_t)	[ft]	23.67	
Elastic section modulus of full unreduced section relative to extreme com...	[in3]	4.37	Sec. F2
End moment coefficient in interaction formula (C_{TFx})	--	1.00	Eq. F2.1.2-3
Elastic critical lateral-torsional buckling stress (F_{crex})	[Kip/in2]	38.69	Eq. F2.1.1-1
Critical buckling stress (F_{nx})	[Kip/in2]	38.69	Eq. F2.1-5
Elastic section modulus of effective section (S_{cx})	[in3]	4.30	
Nominal lateral-torsional buckling moment strength (M_n)	[Kip*ft]	14.08	Eq. F2.1-1
Factored moment distortional buckling capacity (M_n/Ω):	[Kip*ft]	13.13	Sec. F4
Elastic section modulus of full unreduced cross-section relative to extrem...	[in3]	4.37	
Yield Moment (M_y)	[Kip*ft]	29.12	Eq. F4.1-4
Elastic section modulus of full unreduced section relative to extreme com...	[in3]	4.37	Sec. F2
Critical member length for distortional buckling (L_{cr})	[ft]	2.19	
Unbraced length to restrain distortional buckling (L_m)	[ft]	23.67	
Coefficient for moment gradient (β)	--	1.00	
Elastic rotational stiffness provided by the flange (flange/web) (K_{phife})	[Kip]	1.59	Eq. Ap2.3.1.3-3
Elastic rotational stiffness provided by the web (flange/web) (K_{phiwe})	[Kip]	1.42	
Rotational stiffness provided by the bracing system (flange/web) (K_{phi})	[Kip]	0.00	
Geometric rotational stiffness by the flange (flange/web) (K_{phifg})	[in2]	0.04	Eq. Ap2.3.1.3-5
Geometric rotational stiffness by the web (flange/web) (P_{phiwg})	[in2]	0.00	
Distortional buckling stress (F_d)	[Kip/in2]	72.57	
Distortional buckling moment (M_{crd})	[Kip*ft]	26.41	Eq. F4.1-5
Slenderness ratio (λ_d)	--	1.05	Eq. F4.1-3
Nominal moment distortional buckling capacity (M_n)	[Kip*ft]	21.92	Eq. F4.1-2
Factored local buckling strength (M_n/Ω):	[Kip*ft]	8.30	Sec. F3
Elastic section modulus of effective section (S_e)	[in3]	4.30	
Effective section modulus calculated at extreme fiber tension stress of Fy ...	[in3]	4.24	
Local buckling (M_n)	[Kip*ft]	13.86	Eq. F3.1-1

Bending about the minor axis 22

Ratio	:	0.00			
Capacity	:	4.57 [Kip*ft]	Reference	:	Sec. F3
Demand	:	0.00 [Kip*ft]	Ctrl Eq.	:	C1 at 0.00%

Intermediate results	Unit	Value	Reference
Factored section moment capacity (M_n/Ω):	[Kip*ft]	4.81	Sec. F2
Elastic section modulus of full unreduced section relative to extreme com...	[in3]	2.58	Sec. F2
Nominal section moment capacity (M_n)	[Kip*ft]	8.04	Eq. C3.1.1-1
Factored lateral-torsional buckling strength (M_n/Ω):	[Kip*ft]	10.05	Sec. F2
Lateral-torsional buckling modification factor (C_b)	--	1.00	Eq. F2.1.1-2
Polar radius of gyration of cross-section about shear center (r_o)	[Kip]	0.37	
Effective length factor (K_x)	--	1.00	
Unbraced length (L_x)	[ft]	27.00	
Elastic flexural buckling stress (major principal axis) (σ_{ex})	[Kip/in2]	27.32	Eq. E2.2-6
Elastic torsional buckling stress (major principal axis) (σ_t)	[Kip/in2]	6.60	Eq. E2.2-5
Effective length factor for torsional buckling (K_t)	--	1.00	
Torsional unbraced length (L_t)	[ft]	23.67	
Elastic section modulus of full unreduced section relative to extreme com...	[in3]	2.58	Sec. F2
End moment coefficient in interaction formula (C_{TFy})	--	1.00	Eq. F2.1.2-3
Coefficient for lateral-torsional buckling (C_{Sy})	--	1.00	Eq. F2.1.3-1
Elastic critical lateral-torsional buckling stress (F_{crey})	[Kip/in2]	181.60	Eq. F2.1.2-1
Critical buckling stress (F_{ny})	[Kip/in2]	78.01	Eq. F2.1-4
Elastic section modulus of effective section (S_{cy})	[in3]	1.82	
Nominal lateral-torsional buckling moment strength (M_n)	[Kip*ft]	16.78	Eq. F2.1-1
Factored local buckling strength (M_n/Ω):	[Kip*ft]	4.57	Sec. F3
Elastic section modulus of effective section (S_e)	[in3]	1.82	

Effective section modulus calculated at extreme fiber tension stress of Fy ...	[in3]	1.14	
Local buckling (M n)	[Kip*ft]	7.63	Eq. F3.1-1

Web Crippling Design ✔

Web crippling

Ratio	:	0.06			
Capacity	:	1.43 [Kip]	Reference	:	Sec. G5
Demand	:	0.09 [Kip]	Ctrl Eq.	:	C12 at 28.51%

Intermediate results	Unit	Value	Reference
Factored web crippling capacity (P_n/Ω):	[Kip]	1.43	Sec. G5
Bearing length for web crippling calculation (N)	[ft]	0.00	
Limit (R/t)	--	9.00	Tab. G5-2
Coefficient (C)	--	4.00	Tab. G5-2
Inside bend radius coefficient (C R)	--	0.14	Tab. G5-2
Bearing length coefficient (C N)	--	0.35	Tab. G5-2
Web slenderness coefficient (C h)	--	0.02	Tab. G5-2
Crippling strength factor (F)	--	1.75	Tab. G5-2
Nominal web crippling capacity (P n)	[Kip]	2.51	Eq. G5-1

Combined Actions Design ✔

Combined bending and web crippling interaction

Ratio	:	0.17			
Ctrl Eq.	:	C12 at 0.00%	Reference	:	Sec. H3

Intermediate results	Unit	Value	Reference
Design flexural strength about x-axis (M nxo)	[Kip*ft]	29.12	
Nominal web crippling capacity (P n)	[Kip]	2.51	

Combined bending and shear interaction

Ratio	:	0.41			
Ctrl Eq.	:	C12 at 0.00%	Reference	:	Sec. H2

Intermediate results	Unit	Value	Reference
Combined bending and shear interaction (x-x) :	--	0.41	Sec. H2
Design flexural strength about x-axis (M nxo)	[Kip*ft]	17.43	
Design shear strength along y-axis (V ny)	[Kip]	15.56	
Combined bending and shear interaction(y-y) :	--	0.00	
Design flexural strength about y-axis (M nyo)	[Kip*ft]	4.81	
Design shear strength along x-axis (V nx)	[Kip]	18.19	

Combined bending and tension interaction

Ratio	:	0.70			
Ctrl Eq.	:	C12 at 0.00%	Reference	:	Eq. H1.1-2

Intermediate results	Unit	Value	Reference
Combined tensile axial and bending (flexure with tension yielding) :	--	0.33	Eq. H1.1-1
Design flexural strength about x-axis (M nx)	[Kip*ft]	17.43	
Design flexural strength about y-axis (M ny)	[Kip*ft]	10.31	
Design torsion capacity (T n)	[Kip]	52.30	
Combined tensile axial and bending (flexure with buckling) :	--	0.70	Eq. H1.1-2
Design flexural strength about x-axis (M nx)	[Kip*ft]	8.30	
Design flexural strength about y-axis (M ny)	[Kip*ft]	4.57	
Design torsion capacity (T n)	[Kip]	52.30	

Combined bending and compression interaction

Ratio	:	0.70		
Ctrl Eq.	:	C12 at 0.00%	Reference	: Eq. H1.2-1

Intermediate results	Unit	Value	Reference
Combined bending and compression interaction :	--	0.70	Eq. H1.2-1
Design compressive strength (P_n)	[Kip]	3.82	
Design axial strength (P_{no})	[Kip]	47.99	
Design flexural strength about x-axis (M_{nx})	[Kip*ft]	8.30	
Design flexural strength about y-axis (M_{ny})	[Kip*ft]	4.57	

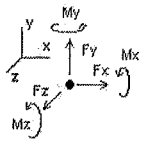
RAM Elements

Current Date: 6/12/2025 8:26 PM
Units system: English

Analysis result

Nodes

Reactions



Direction of positive forces and moments

Node	Forces [Kip] FX	FY	FZ	Moments [Kip*ft] MX	MY	MZ
Condition **C1=DL+CL+LLr**						
1	0.00000	28.41719	0.00000	0.00000	0.00000	-0.68033
SUM	0.00000	28.41719	0.00000	0.00000	0.00000	-0.68033
Condition **C2=DL+CL+SLb**						
1	0.00000	48.04262	0.00000	0.00000	0.00000	-0.53336
SUM	0.00000	48.04262	0.00000	0.00000	0.00000	-0.53336
Condition **C3=DL+CL+SLu**						
1	0.00000	10.03794	0.00000	0.00000	0.00000	-0.81636
SUM	0.00000	10.03794	0.00000	0.00000	0.00000	-0.81636
Condition **C4=DL+CL+0.6WLperA+0.6WLpin**						
1	-1.60162	23.08182	0.00000	0.00000	0.00000	138.20468
SUM	-1.60162	23.08182	0.00000	0.00000	0.00000	138.20468
Condition **C5=DL+CL+0.6WLperA+0.6WLnin**						
1	-1.60162	23.08182	0.00000	0.00000	0.00000	138.20468
SUM	-1.60162	23.08182	0.00000	0.00000	0.00000	138.20468
Condition **C6=DL+CL+0.6WLlpa+0.6WLpin**						
1	1.70839	-3.87549	0.00000	0.00000	0.00000	-29.82880
SUM	1.70839	-3.87549	0.00000	0.00000	0.00000	-29.82880
Condition **C7=DL+CL+0.6WLwpa+0.6WLnin**						
1	-1.70839	23.95137	0.00000	0.00000	0.00000	28.19607
SUM	-1.70839	23.95137	0.00000	0.00000	0.00000	28.19607
Condition **C8=DL+CL+0.75LLr+0.45WLperA+0.45WLpin**						
1	-1.20122	33.60529	0.00000	0.00000	0.00000	103.55144
SUM	-1.20122	33.60529	0.00000	0.00000	0.00000	103.55144
Condition **C9=DL+0.75LLr+0.45WLperA+0.45WLnin**						
1	-1.20122	29.01047	0.00000	0.00000	0.00000	103.51744
SUM	-1.20122	29.01047	0.00000	0.00000	0.00000	103.51744

Condition	**C10=DL+CL+0.75LLr+0.45WLlpa+0.45WLpin**					
1	1.28129	13.38730	0.00000	0.00000	0.00000	-22.47367
SUM	1.28129	13.38730	0.00000	0.00000	0.00000	-22.47367
Condition	**C11=DL+CL+0.75LLr+0.45WLwpa+0.45WLnin**					
1	-1.28129	34.25745	0.00000	0.00000	0.00000	21.04498
SUM	-1.28129	34.25745	0.00000	0.00000	0.00000	21.04498
Condition	**C12=DL+CL+0.75SLb+0.45WLperA+0.45WLpin**					
1	-1.20122	48.32436	0.00000	0.00000	0.00000	103.66167
SUM	-1.20122	48.32436	0.00000	0.00000	0.00000	103.66167
Condition	**C13=DL+CL+0.75SLb+0.45WLperA+0.45WLnin**					
1	-1.20122	48.32436	0.00000	0.00000	0.00000	103.66167
SUM	-1.20122	48.32436	0.00000	0.00000	0.00000	103.66167
Condition	**C14=DL+CL+0.75SLb+0.45WLlpa+0.45WLpin**					
1	1.28129	28.10638	0.00000	0.00000	0.00000	-22.36343
SUM	1.28129	28.10638	0.00000	0.00000	0.00000	-22.36343
Condition	**C15=DL+CL+0.75SLb+0.45WLwpa+0.45WLnin**					
1	-1.28129	48.97652	0.00000	0.00000	0.00000	21.15521
SUM	-1.28129	48.97652	0.00000	0.00000	0.00000	21.15521
Condition	**C16=DL+CL+0.75SLu+0.45WLperA+0.45WLpin**					
1	-1.20122	19.82085	0.00000	0.00000	0.00000	103.44942
SUM	-1.20122	19.82085	0.00000	0.00000	0.00000	103.44942
Condition	**C17=DL+CL+0.75SLu+0.45WLperA+0.45WLnin**					
1	-1.20122	19.82085	0.00000	0.00000	0.00000	103.44942
SUM	-1.20122	19.82085	0.00000	0.00000	0.00000	103.44942
Condition	**C18=0.6DL+0.6CL+0.6WLperA+0.6WLpin**					
1	-1.60162	19.06665	0.00000	0.00000	0.00000	138.53123
SUM	-1.60162	19.06665	0.00000	0.00000	0.00000	138.53123
Condition	**C19=0.6DL+0.6CL+0.6WLperA+0.6WLnin**					
1	-1.60162	19.06665	0.00000	0.00000	0.00000	138.53123
SUM	-1.60162	19.06665	0.00000	0.00000	0.00000	138.53123
Condition	**C20=0.6DL+0.6CL+0.6WLlpa+0.6WLpin**					
1	1.70839	-7.89066	0.00000	0.00000	0.00000	-29.50225
SUM	1.70839	-7.89066	0.00000	0.00000	0.00000	-29.50225
Condition	**C21=0.6DL+0.6CL+0.6WLwpa+0.6WLnin**					
1	-1.70839	19.93619	0.00000	0.00000	0.00000	28.52261
SUM	-1.70839	19.93619	0.00000	0.00000	0.00000	28.52261
Condition	**C22=0.6DL+0.6CL+0.45WLperA+0.45WLlpa+0.45WLpin**					
1	0.08008	5.37060	0.00000	0.00000	0.00000	82.01664
SUM	0.08008	5.37060	0.00000	0.00000	0.00000	82.01664
Condition	**C23=0.6DL+0.6CL+0.45WLperA+0.45WLwpa+0.45WLnin**					
1	-2.48251	26.24075	0.00000	0.00000	0.00000	125.53529
SUM	-2.48251	26.24075	0.00000	0.00000	0.00000	125.53529

Condition	**C24=DL+CL+0.6WLpr2A+0.6WLpin**					
1	-1.60162	23.08182	0.00000	0.00000	0.00000	-85.43892
SUM	-1.60162	23.08182	0.00000	0.00000	0.00000	-85.43892
Condition	**C25=DL+CL+0.6WLpr2A+0.6WLnin**					
1	-1.60162	23.08182	0.00000	0.00000	0.00000	-85.43892
SUM	-1.60162	23.08182	0.00000	0.00000	0.00000	-85.43892
Condition	**C26=DL+CL+0.6WLlpa+0.6WLpin**					
1	1.70839	-3.87549	0.00000	0.00000	0.00000	-29.82880
SUM	1.70839	-3.87549	0.00000	0.00000	0.00000	-29.82880
Condition	**C27=DL+CL+0.6WLwpa+0.6WLnin**					
1	-1.70839	23.95137	0.00000	0.00000	0.00000	28.19607
SUM	-1.70839	23.95137	0.00000	0.00000	0.00000	28.19607
Condition	**C28=DL+CL+0.75LLr+0.45WLpr2A+0.45WLpin**					
1	-1.20122	33.60529	0.00000	0.00000	0.00000	-64.18126
SUM	-1.20122	33.60529	0.00000	0.00000	0.00000	-64.18126
Condition	**C29=DL+0.75LLr+0.45WLpr2A+0.45WLnin**					
1	-1.20122	29.01047	0.00000	0.00000	0.00000	-64.21527
SUM	-1.20122	29.01047	0.00000	0.00000	0.00000	-64.21527
Condition	**C30=DL+CL+0.75LLr+0.45WLlpa+0.45WLpin**					
1	1.28129	13.38730	0.00000	0.00000	0.00000	-22.47367
SUM	1.28129	13.38730	0.00000	0.00000	0.00000	-22.47367
Condition	**C31=DL+CL+0.75LLr+0.45WLwpa+0.45WLnin**					
1	-1.28129	34.25745	0.00000	0.00000	0.00000	21.04498
SUM	-1.28129	34.25745	0.00000	0.00000	0.00000	21.04498
Condition	**C32=DL+CL+0.75SLb+0.45WLpr2A+0.45WLpin**					
1	-1.20122	48.32436	0.00000	0.00000	0.00000	-64.07103
SUM	-1.20122	48.32436	0.00000	0.00000	0.00000	-64.07103
Condition	**C33=DL+CL+0.75SLb+0.45WLpr2A+0.45WLnin**					
1	-1.20122	48.32436	0.00000	0.00000	0.00000	-64.07103
SUM	-1.20122	48.32436	0.00000	0.00000	0.00000	-64.07103
Condition	**C34=DL+CL+0.75SLb+0.45WLlpa+0.45WLpin**					
1	1.28129	28.10638	0.00000	0.00000	0.00000	-22.36343
SUM	1.28129	28.10638	0.00000	0.00000	0.00000	-22.36343
Condition	**C35=DL+CL+0.75SLb+0.45WLwpa+0.45WLnin**					
1	-1.28129	48.97652	0.00000	0.00000	0.00000	21.15521
SUM	-1.28129	48.97652	0.00000	0.00000	0.00000	21.15521
Condition	**C36=DL+CL+0.75SLu+0.45WLpr2A+0.45WLpin**					
1	-1.20122	19.82085	0.00000	0.00000	0.00000	-64.28328
SUM	-1.20122	19.82085	0.00000	0.00000	0.00000	-64.28328
Condition	**C37=DL+CL+0.75SLu+0.45WLpr2A+0.45WLnin**					
1	-1.20122	19.82085	0.00000	0.00000	0.00000	-64.28328
SUM	-1.20122	19.82085	0.00000	0.00000	0.00000	-64.28328

Condition	**C38=0.6DL+0.6CL+0.6WLpr2A+0.6WLpin**					
1	-1.60162	19.06665	0.00000	0.00000	0.00000	-85.11238
SUM	-1.60162	19.06665	0.00000	0.00000	0.00000	-85.11238
Condition	**C39=0.6DL+0.6CL+0.6WLpr2A+0.6WLnin**					
1	-1.60162	19.06665	0.00000	0.00000	0.00000	-85.11238
SUM	-1.60162	19.06665	0.00000	0.00000	0.00000	-85.11238
Condition	**C40=0.6DL+0.6CL+0.6WLlpa+0.6WLpin**					
1	1.70839	-7.89066	0.00000	0.00000	0.00000	-29.50225
SUM	1.70839	-7.89066	0.00000	0.00000	0.00000	-29.50225
Condition	**C41=0.6DL+0.6CL+0.6WLwpa+0.6WLnin**					
1	-1.70839	19.93619	0.00000	0.00000	0.00000	28.52261
SUM	-1.70839	19.93619	0.00000	0.00000	0.00000	28.52261
Condition	**C42=0.6DL+0.6CL+0.45WLpr2A+0.45WLlpa+0.45WLpin**					
1	0.08008	5.37060	0.00000	0.00000	0.00000	-85.71606
SUM	0.08008	5.37060	0.00000	0.00000	0.00000	-85.71606
Condition	**C43=0.6DL+0.6CL+0.45WLpr2A+0.45WLwpa+0.45WLnin**					
1	-2.48251	26.24075	0.00000	0.00000	0.00000	-42.19741
SUM	-2.48251	26.24075	0.00000	0.00000	0.00000	-42.19741
Condition	**C44=DL+CL+0.6WLpr2B+0.6WLpin**					
1	1.28129	-0.39713	0.00000	0.00000	0.00000	101.67264
SUM	1.28129	-0.39713	0.00000	0.00000	0.00000	101.67264
Condition	**C45=DL+CL+0.6WLpr2B+0.6WLnin**					
1	1.28129	-0.39713	0.00000	0.00000	0.00000	101.67264
SUM	1.28129	-0.39713	0.00000	0.00000	0.00000	101.67264
Condition	**C46=DL+CL+0.6WLlpa+0.6WLpin**					
1	1.70839	-3.87549	0.00000	0.00000	0.00000	-29.82880
SUM	1.70839	-3.87549	0.00000	0.00000	0.00000	-29.82880
Condition	**C47=DL+CL+0.6WLwpa+0.6WLnin**					
1	-1.70839	23.95137	0.00000	0.00000	0.00000	28.19607
SUM	-1.70839	23.95137	0.00000	0.00000	0.00000	28.19607
Condition	**C48=DL+CL+0.75LLr+0.45WLpr2B+0.45WLpin**					
1	0.96097	15.99607	0.00000	0.00000	0.00000	76.15241
SUM	0.96097	15.99607	0.00000	0.00000	0.00000	76.15241
Condition	**C49=DL+CL+0.75LLr+0.45WLpr2B+0.45WLnin**					
1	0.96097	15.99607	0.00000	0.00000	0.00000	76.15241
SUM	0.96097	15.99607	0.00000	0.00000	0.00000	76.15241
Condition	**C50=DL+CL+0.75LLr+0.45WLlpa+0.45WLpin**					
1	1.28129	13.38730	0.00000	0.00000	0.00000	-22.47367
SUM	1.28129	13.38730	0.00000	0.00000	0.00000	-22.47367
Condition	**C51=DL+CL+0.75LLr+0.45WLwpa+0.45WLnin**					
1	-1.28129	34.25745	0.00000	0.00000	0.00000	21.04498
SUM	-1.28129	34.25745	0.00000	0.00000	0.00000	21.04498

Condition	**C52=DL+CL+0.75SLb+0.45WLpr2B+0.45WLpin**					
1	0.96097	30.71515	0.00000	0.00000	0.00000	76.26264
SUM	0.96097	30.71515	0.00000	0.00000	0.00000	76.26264
Condition	**C53=DL+CL+0.75SLb+0.45WLpr2B+0.45WLnin**					
1	0.96097	30.71515	0.00000	0.00000	0.00000	76.26264
SUM	0.96097	30.71515	0.00000	0.00000	0.00000	76.26264
Condition	**C54=DL+CL+0.75SLb+0.45WLlpa+0.45WLpin**					
1	1.28129	28.10638	0.00000	0.00000	0.00000	-22.36343
SUM	1.28129	28.10638	0.00000	0.00000	0.00000	-22.36343
Condition	**C55=DL+CL+0.75SLb+0.45WLwpa+0.45WLnin**					
1	-1.28129	48.97652	0.00000	0.00000	0.00000	21.15521
SUM	-1.28129	48.97652	0.00000	0.00000	0.00000	21.15521
Condition	**C56=DL+CL+0.75SLu+0.45WLpr2B+0.45WLpin**					
1	0.96097	2.21164	0.00000	0.00000	0.00000	76.05039
SUM	0.96097	2.21164	0.00000	0.00000	0.00000	76.05039
Condition	**C57=DL+CL+0.75SLu+0.45WLpr2B+0.45WLnin**					
1	0.96097	2.21164	0.00000	0.00000	0.00000	76.05039
SUM	0.96097	2.21164	0.00000	0.00000	0.00000	76.05039
Condition	**C58=0.6DL+0.6CL+0.6WLpr2B+0.6WLpin**					
1	1.28129	-4.41231	0.00000	0.00000	0.00000	101.99918
SUM	1.28129	-4.41231	0.00000	0.00000	0.00000	101.99918
Condition	**C59=0.6DL+0.6CL+0.6WLpr2B+0.6WLnin**					
1	1.28129	-4.41231	0.00000	0.00000	0.00000	101.99918
SUM	1.28129	-4.41231	0.00000	0.00000	0.00000	101.99918
Condition	**C60=0.6DL+0.6CL+0.6WLlpa+0.6WLpin**					
1	1.70839	-7.89066	0.00000	0.00000	0.00000	-29.50225
SUM	1.70839	-7.89066	0.00000	0.00000	0.00000	-29.50225
Condition	**C61=0.6DL+0.6CL+0.6WLwpa+0.6WLnin**					
1	-1.70839	19.93619	0.00000	0.00000	0.00000	28.52261
SUM	-1.70839	19.93619	0.00000	0.00000	0.00000	28.52261
Condition	**C62=0.6DL+0.6CL+0.45WLpr2B+0.45WLlpa+0.45WLpin**					
1	2.24226	-12.23861	0.00000	0.00000	0.00000	54.61761
SUM	2.24226	-12.23861	0.00000	0.00000	0.00000	54.61761
Condition	**C63=0.6DL+0.6CL+0.45WLpr2B+0.45WLwpa+0.45WLnin**					
1	-0.32032	8.63153	0.00000	0.00000	0.00000	98.13626
SUM	-0.32032	8.63153	0.00000	0.00000	0.00000	98.13626
Condition	**C64=DL+CL+0.6WLperB+0.6WLpin**					
1	1.28129	-0.39713	0.00000	0.00000	0.00000	-146.82401
SUM	1.28129	-0.39713	0.00000	0.00000	0.00000	-146.82401
Condition	**C65=DL+CL+0.6WLperB+0.6WLnin**					
1	1.28129	-0.39713	0.00000	0.00000	0.00000	-146.82401
SUM	1.28129	-0.39713	0.00000	0.00000	0.00000	-146.82401

Condition	**C66=DL+CL+0.6WLlpa+0.6WLpin**					
1	1.70839	-3.87549	0.00000	0.00000	0.00000	-29.82880
SUM	1.70839	-3.87549	0.00000	0.00000	0.00000	-29.82880
Condition	**C67=DL+CL+0.6WLwpa+0.6WLnin**					
1	-1.70839	23.95137	0.00000	0.00000	0.00000	28.19607
SUM	-1.70839	23.95137	0.00000	0.00000	0.00000	28.19607
Condition	**C68=DL+CL+0.75LLr+0.45WLperB+0.45WLpin**					
1	0.96097	15.99607	0.00000	0.00000	0.00000	-110.22008
SUM	0.96097	15.99607	0.00000	0.00000	0.00000	-110.22008
Condition	**C69=DL+0.75LLr+0.45WLperB+0.45WLnin**					
1	0.96097	11.40126	0.00000	0.00000	0.00000	-110.25409
SUM	0.96097	11.40126	0.00000	0.00000	0.00000	-110.25409
Condition	**C70=DL+CL+0.75LLr+0.45WLlpa+0.45WLpin**					
1	1.28129	13.38730	0.00000	0.00000	0.00000	-22.47367
SUM	1.28129	13.38730	0.00000	0.00000	0.00000	-22.47367
Condition	**C71=DL+CL+0.75LLr+0.45WLwpa+0.45WLnin**					
1	-1.28129	34.25745	0.00000	0.00000	0.00000	21.04498
SUM	-1.28129	34.25745	0.00000	0.00000	0.00000	21.04498
Condition	**C72=DL+CL+0.75SLb+0.45WLperB+0.45WLpin**					
1	0.96097	30.71515	0.00000	0.00000	0.00000	-110.10985
SUM	0.96097	30.71515	0.00000	0.00000	0.00000	-110.10985
Condition	**C73=DL+CL+0.75SLb+0.45WLperB+0.45WLnin**					
1	0.96097	30.71515	0.00000	0.00000	0.00000	-110.10985
SUM	0.96097	30.71515	0.00000	0.00000	0.00000	-110.10985
Condition	**C74=DL+CL+0.75SLb+0.45WLlpa+0.45WLpin**					
1	1.28129	28.10638	0.00000	0.00000	0.00000	-22.36343
SUM	1.28129	28.10638	0.00000	0.00000	0.00000	-22.36343
Condition	**C75=DL+CL+0.75SLb+0.45WLwpa+0.45WLnin**					
1	-1.28129	48.97652	0.00000	0.00000	0.00000	21.15521
SUM	-1.28129	48.97652	0.00000	0.00000	0.00000	21.15521
Condition	**C76=DL+CL+0.75SLu+0.45WLperB+0.45WLpin**					
1	0.96097	2.21164	0.00000	0.00000	0.00000	-110.32210
SUM	0.96097	2.21164	0.00000	0.00000	0.00000	-110.32210
Condition	**C77=DL+CL+0.75SLu+0.45WLperB+0.45WLnin**					
1	0.96097	2.21164	0.00000	0.00000	0.00000	-110.32210
SUM	0.96097	2.21164	0.00000	0.00000	0.00000	-110.32210
Condition	**C78=0.6DL+0.6CL+0.6WLperB+0.6WLpin**					
1	1.28129	-4.41231	0.00000	0.00000	0.00000	-146.49747
SUM	1.28129	-4.41231	0.00000	0.00000	0.00000	-146.49747
Condition	**C79=0.6DL+0.6CL+0.6WLperB+0.6WLnin**					
1	1.28129	-4.41231	0.00000	0.00000	0.00000	-146.49747
SUM	1.28129	-4.41231	0.00000	0.00000	0.00000	-146.49747

Condition	**C80=0.6DL+0.6CL+0.6WLlpa+0.6WLpin**					
1	1.70839	-7.89066	0.00000	0.00000	0.00000	-29.50225
SUM	1.70839	-7.89066	0.00000	0.00000	0.00000	-29.50225
Condition	**C81=0.6DL+0.6CL+0.6WLwpa+0.6WLnin**					
1	-1.70839	19.93619	0.00000	0.00000	0.00000	28.52261
SUM	-1.70839	19.93619	0.00000	0.00000	0.00000	28.52261
Condition	**C82=0.6DL+0.6CL+0.45WLperB+0.45WLlpa+0.45WLpin**					
1	2.24226	-12.23861	0.00000	0.00000	0.00000	-131.75488
SUM	2.24226	-12.23861	0.00000	0.00000	0.00000	-131.75488
Condition	**C83=0.6DL+0.6CL+0.45WLperB+0.45WLwpa+0.45WLnin**					
1	-0.32032	8.63153	0.00000	0.00000	0.00000	-88.23623
SUM	-0.32032	8.63153	0.00000	0.00000	0.00000	-88.23623
Condition	**C84=DL+0.75SLb+0.525Eqx**					
1	-0.99065	33.94664	0.00000	0.00000	0.00000	15.08242
SUM	-0.99065	33.94664	0.00000	0.00000	0.00000	15.08242
Condition	**C85=DL+0.75SLb+0.525Eqz**					
1	0.00000	33.94664	-0.99065	-15.72054	-0.71198	-0.63812
SUM	0.00000	33.94664	-0.99065	-15.72054	-0.71198	-0.63812
Condition	**C86=DL+0.7Eqx**					
1	-1.32086	5.44313	0.00000	0.00000	0.00000	20.11035
SUM	-1.32086	5.44313	0.00000	0.00000	0.00000	20.11035
Condition	**C87=DL+0.7Eqz**					
1	0.00000	5.44313	-1.32086	-20.96072	-0.94930	-0.85037
SUM	0.00000	5.44313	-1.32086	-20.96072	-0.94930	-0.85037

RAM Elements

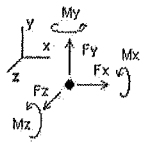
Current Date: 6/12/2025 8:26 PM
Units system: English

Analysis result

Nodes

Envelope for nodal reactions

Note.- **Ic** is the controlling load condition



Direction of positive forces and moments

Envelope of nodal reactions for :

C1=DL+CL+LLr
C2=DL+CL+SLb
C3=DL+CL+SLu
C4=DL+CL+0.6WLperA+0.6WLpin
C5=DL+CL+0.6WLperA+0.6WLnin
C6=DL+CL+0.6WLlpa+0.6WLpin
C7=DL+CL+0.6WLwpa+0.6WLnin
C8=DL+CL+0.75LLr+0.45WLperA+0.45WLpin
C9=DL+0.75LLr+0.45WLperA+0.45WLnin
C10=DL+CL+0.75LLr+0.45WLlpa+0.45WLpin
C11=DL+CL+0.75LLr+0.45WLwpa+0.45WLnin
C12=DL+CL+0.75SLb+0.45WLperA+0.45WLpin
C13=DL+CL+0.75SLb+0.45WLperA+0.45WLnin
C14=DL+CL+0.75SLb+0.45WLlpa+0.45WLpin
C15=DL+CL+0.75SLb+0.45WLwpa+0.45WLnin
C16=DL+CL+0.75SLu+0.45WLperA+0.45WLpin
C17=DL+CL+0.75SLu+0.45WLperA+0.45WLnin
C18=0.6DL+0.6CL+0.6WLperA+0.6WLpin
C19=0.6DL+0.6CL+0.6WLperA+0.6WLnin
C20=0.6DL+0.6CL+0.6WLlpa+0.6WLpin
C21=0.6DL+0.6CL+0.6WLwpa+0.6WLnin
C22=0.6DL+0.6CL+0.45WLperA+0.45WLlpa+0.45WLpin
C23=0.6DL+0.6CL+0.45WLperA+0.45WLwpa+0.45WLnin
C24=DL+CL+0.6WLpr2A+0.6WLpin
C25=DL+CL+0.6WLpr2A+0.6WLnin
C26=DL+CL+0.6WLlpa+0.6WLpin
C27=DL+CL+0.6WLwpa+0.6WLnin
C28=DL+CL+0.75LLr+0.45WLpr2A+0.45WLpin
C29=DL+0.75LLr+0.45WLpr2A+0.45WLnin
C30=DL+CL+0.75LLr+0.45WLlpa+0.45WLpin
C31=DL+CL+0.75LLr+0.45WLwpa+0.45WLnin
C32=DL+CL+0.75SLb+0.45WLpr2A+0.45WLpin
C33=DL+CL+0.75SLb+0.45WLpr2A+0.45WLnin
C34=DL+CL+0.75SLb+0.45WLlpa+0.45WLpin
C35=DL+CL+0.75SLb+0.45WLwpa+0.45WLnin
C36=DL+CL+0.75SLu+0.45WLpr2A+0.45WLpin
C37=DL+CL+0.75SLu+0.45WLpr2A+0.45WLnin
C38=0.6DL+0.6CL+0.6WLpr2A+0.6WLpin
C39=0.6DL+0.6CL+0.6WLpr2A+0.6WLnin
C40=0.6DL+0.6CL+0.6WLlpa+0.6WLpin
C41=0.6DL+0.6CL+0.6WLwpa+0.6WLnin
C42=0.6DL+0.6CL+0.45WLpr2A+0.45WLlpa+0.45WLpin
C43=0.6DL+0.6CL+0.45WLpr2A+0.45WLwpa+0.45WLnin
C44=DL+CL+0.6WLpr2B+0.6WLpin
C45=DL+CL+0.6WLpr2B+0.6WLnin
C46=DL+CL+0.6WLlpa+0.6WLpin
C47=DL+CL+0.6WLwpa+0.6WLnin
C48=DL+CL+0.75LLr+0.45WLpr2B+0.45WLpin
C49=DL+CL+0.75LLr+0.45WLpr2B+0.45WLnin
C50=DL+CL+0.75LLr+0.45WLlpa+0.45WLpin
C51=DL+CL+0.75LLr+0.45WLwpa+0.45WLnin

C52=DL+CL+0.75SLb+0.45WLpr2B+0.45WLpin
C53=DL+CL+0.75SLb+0.45WLpr2B+0.45WLnin
C54=DL+CL+0.75SLb+0.45WLlpa+0.45WLpin
C55=DL+CL+0.75SLb+0.45WLwpa+0.45WLnin
C56=DL+CL+0.75SLu+0.45WLpr2B+0.45WLpin
C57=DL+CL+0.75SLu+0.45WLpr2B+0.45WLnin
C58=0.6DL+0.6CL+0.6WLpr2B+0.6WLpin
C59=0.6DL+0.6CL+0.6WLpr2B+0.6WLnin
C60=0.6DL+0.6CL+0.6WLlpa+0.6WLpin
C61=0.6DL+0.6CL+0.6WLwpa+0.6WLnin
C62=0.6DL+0.6CL+0.45WLpr2B+0.45WLlpa+0.45WLpin
C63=0.6DL+0.6CL+0.45WLpr2B+0.45WLwpa+0.45WLnin
C64=DL+CL+0.6WLperB+0.6WLpin
C65=DL+CL+0.6WLperB+0.6WLnin
C66=DL+CL+0.6WLlpa+0.6WLpin
C67=DL+CL+0.6WLwpa+0.6WLnin
C68=DL+CL+0.75LLr+0.45WLperB+0.45WLpin
C69=DL+0.75LLr+0.45WLperB+0.45WLnin
C70=DL+CL+0.75LLr+0.45WLlpa+0.45WLpin
C71=DL+CL+0.75LLr+0.45WLwpa+0.45WLnin
C72=DL+CL+0.75SLb+0.45WLperB+0.45WLpin
C73=DL+CL+0.75SLb+0.45WLperB+0.45WLnin
C74=DL+CL+0.75SLb+0.45WLlpa+0.45WLpin
C75=DL+CL+0.75SLb+0.45WLwpa+0.45WLnin
C76=DL+CL+0.75SLu+0.45WLperB+0.45WLpin
C77=DL+CL+0.75SLu+0.45WLperB+0.45WLnin
C78=0.6DL+0.6CL+0.6WLperB+0.6WLpin
C79=0.6DL+0.6CL+0.6WLperB+0.6WLnin
C80=0.6DL+0.6CL+0.6WLlpa+0.6WLpin
C81=0.6DL+0.6CL+0.6WLwpa+0.6WLnin
C82=0.6DL+0.6CL+0.45WLperB+0.45WLlpa+0.45WLpin
C83=0.6DL+0.6CL+0.45WLperB+0.45WLwpa+0.45WLnin
C84=DL+0.75SLb+0.525Eqx
C85=DL+0.75SLb+0.525Eqz
C86=DL+0.7Eqx
C87=DL+0.7Eqz

Node		Forces						Moments					
		Fx [Kip]	lc	Fy [Kip]	lc	Fz [Kip]	lc	Mx [Kip*ft]	lc	My [Kip*ft]	lc	Mz [Kip*ft]	lc
1	Max	2.242	C62	48.977	C15	0.000	C1	0.00000	C1	0.00000	C1	138.53123	C18
	Min	-2.483	C43	-12.239	C82	-1.321	C87	-20.96072	C87	-0.94930	C87	-146.82401	C64

SML.25.047 **6/4/2025**

3.5+3.5 T Frame

Load Combination C82 Controls

Dimensions

Building Width (ft)	27
Footing Length (ft)	9

Column Loads

Down (kips)	0
Up (kips)	12.24
Horz. (kips)	2.25
Moment (ft-kips)	131.76
Floor Surcharge (ksf)	0
P_V (k/ft)	0.000
P_H (k/ft)	0.250

Material Properties

Soil

Lateral Bearing (ksf/ft)	0.22
γ_{soil} (pcf)	110
ø (deg)	30
ø (rad)	0.524
Lat Res @ Top (ksf)	0.55
Lat Res @ Top (ksf)	0.88
Sliding Res. (k/ft)	1.07
K_a	0.333

P_g (k/ft)	0.038

Checks

Overtuning	**OK**	1.50
Bearing P1	**OK**	0.42
Bearing P2	**OK**	0.00
Sliding	**OK**	11.28
Uplift	**OK**	
Two Way Shear	**OK**	
One Way Shear	**OK**	

Foundation Dimensions

Post Height above Pier (ft)	0
Pier Height above Grade (ft)	2.1
H (ft)	2.1
J (ft)	2.5
W (ft)	11.75
W_t (in) Width x Into Page	36
F_t (in)	18
Total Height (ft)	4.6
Frost Depth (ft)	4.000
Pier Centered on Footing (yes/no)	yes
If no, Provide Heel Length (ft)	0
L_{heel} (ft)	4.375
L_{toe} (ft)	4.375
Load Offset on Pier? If so, provide pos or neg offset (in)	1

Pos –>

Soil Weight

L_{heel} (ft)	4.4
L_{toe} (ft)	4.4
Pier Area	7.1
Volume Below (ft^3)	264.4
Pier Volume below Grade (ft^3)	17.7
Soil Volume (ft^3)	246.7
Soil Weight (lbs)	27137.4

Concrete

γ_{con} (pcf)	150
f'c (psi)	5000

Material Weights

Concrete

W_1 (k/ft)	0.54
W_2 (k/ft)	2.64

Soil

W_4 (k/ft)	1.51
W_5 (k/ft)*	1.51

* Includes Backfill

Centroids*

V_{W1} (ft)	5.88
V_{W2} (ft)	5.88
V_{W3} (ft)	9.56
V_{W4} (ft)	9.56
V_{W5} (ft)	2.19

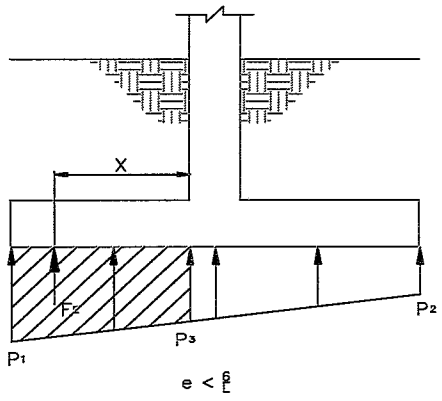
*Distance from rotational point

Overturning

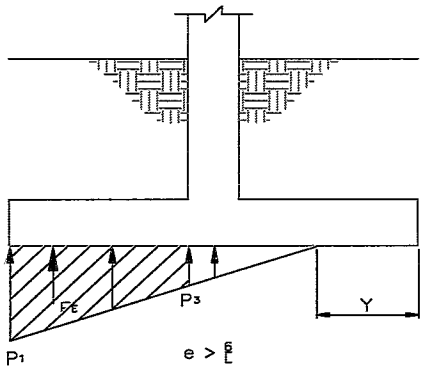
M_O (ft·k/ft)	24.24	
M_R (ft·k/ft)	36.43	
Factor of Safety	1.50	**OK**

Bearing Pressure

Net Allowable (ksf)	1.5	
$P_{total} + W_{total}$ (k/ft)	1.25	
$M_R - M_O$ (k·ft/ft)	12.19	
eccentricity (ft) (About Toe of Footing)	1.97	
eccentricity (ft) (About Center of Footing)	3.91	
Within Middle Third	No	
P_1 (ksf/ft)	0.42	**OK**
P_2 (ksf/ft)	0.00	**OK**
P_3 (ksf/ft)	0.11	
F_E (k/ft)	1.16	
Y (ft)	5.85	
X (ft)	2.62	



e < $\frac{B}{L}$



e > $\frac{B}{L}$

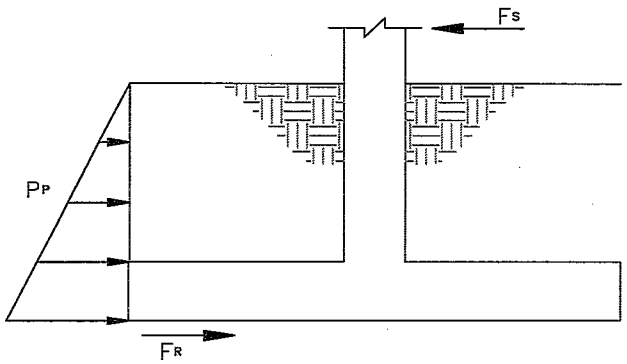
Sliding

Soil Friction

F_R (k/ft)	2.18	

Passive Pressure

P_P (k/ft)	1.07	
Factor of Safety	11.28	OK



Uplift

Factor of Safety	4.56	OK

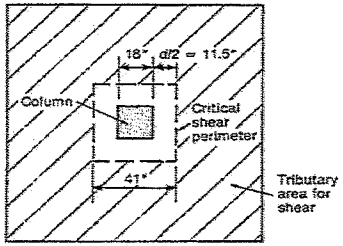
Rebar Required In Footing

Cover for Rebar (in)	3
d (in)*	14.5
M (ft·k/ft)	3.05
Mu (ft·k/ft)	4.88
Mu/.9f'cbd^2	0.0052
w	0.005
p	0.0004
4/3p	0.0006
As (in^2/ft)	0.100
As, Check (Mu/0.9fy(jd))	0.079

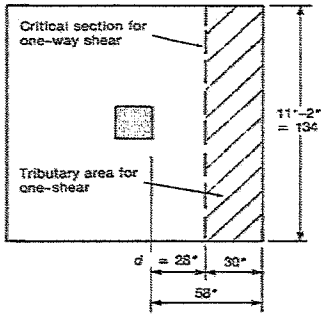
Rebar Required in Pier

Cover for Rebar (in)	3
d (in)*	28.92
M (ft·k/ft)	24.24
Mu (ft·k/ft)	38.79
Mu/.9f'cbd^2	0.0103
w	0.010
p	0.0009
Minimum Steel	5.089
As (in^2/ft)	5.089

*This value can be manually input if a different value is more appropriate



(a) Critical section for two-way shear—First trial.



(c) Critical section for one-way shear.

Two-Way Shear

Pier Dimensions (in x in)	31.9	31.9
d (in)*	14.50	
Factored Soil Pressure	0.00	
Vu (kips)	0	
bo, Shear Perimeter (in)	185.6	
vu Factored Shear Stress	0.0	
Phi vc (psi)	212.1	OK

One-Way Shear

Vu (Kips)	0.0	
Phi Vc (Kips)	166.1	OK

1.Project information

Project description: 3.5+3.5 T Frame
Location:
Design name: Design

Comment:

2. Input Data & Anchor Parameters

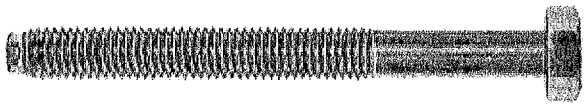
General
Design method:ACI 318-14
Units: Imperial units

Anchor Information:
Anchor type: Cast-in-place
Material: F1554 Grade 105
Diameter (inch): 1.000
Effective Embedment depth, h_{ef} (inch): 13.000
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 14.75
C_{min} (inch): 1.44
S_{min} (inch): 4.00

Base Material
Concrete: Normal-weight
Concrete thickness, h (inch): 13.78
State: Cracked
Compressive strength, f'_c (psi): 5000
$\Psi_{c,V}$: 1.0
Reinforcement condition: B tension, B shear
Supplemental edge reinforcement: Not applicable
Reinforcement provided at corners: No
Ignore concrete breakout in tension: Yes
Ignore concrete breakout in shear: Yes
Ignore 6do requirement: Yes
Build-up grout pad: Yes

Base Plate
Length x Width x Thickness (inch): 17.00 x 27.00 x 0.25

Recommended Anchor
Anchor Name: Heavy Hex Bolt - 1"Ø Heavy Hex Bolt, F1554 Gr. 105



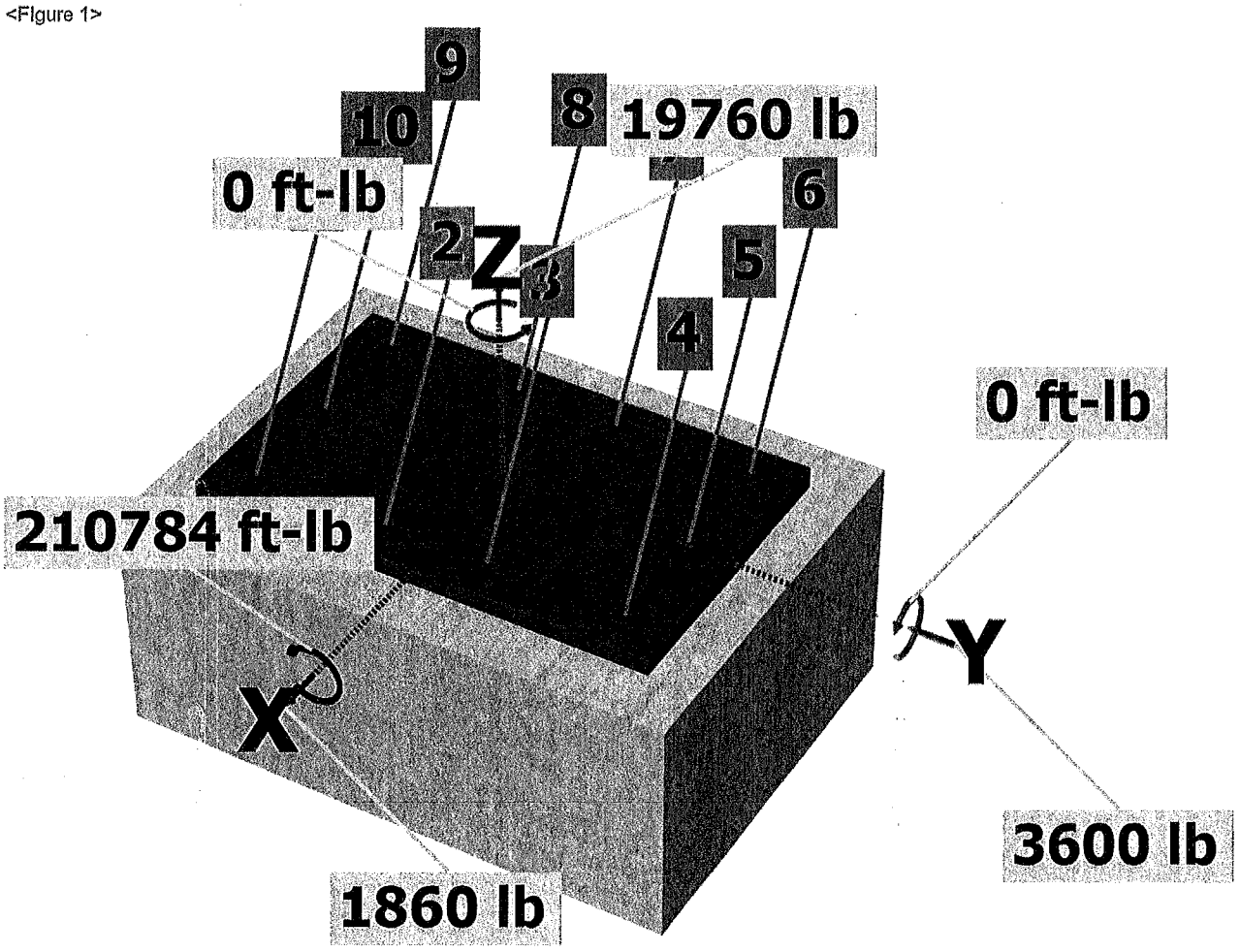
Company:	Servinsky Enginnering & Associates	Date:	6/13/2025
Engineer:	Saksham Nayyar	Page:	3
Project:	Solar Mounts		
Address:	280 Douglas Ave, Holland, MI 49424		
Phone:			
E-mail:	Sakshamn@servinskyeng.com		

Load and Geometry
Load factor source: ACI 318 Section 5.3
Load combination: not set
Seismic design: No
Anchors subjected to sustained tension: Not applicable
Apply entire shear load at front row: No
Anchors only resisting wind and/or seismic loads: No

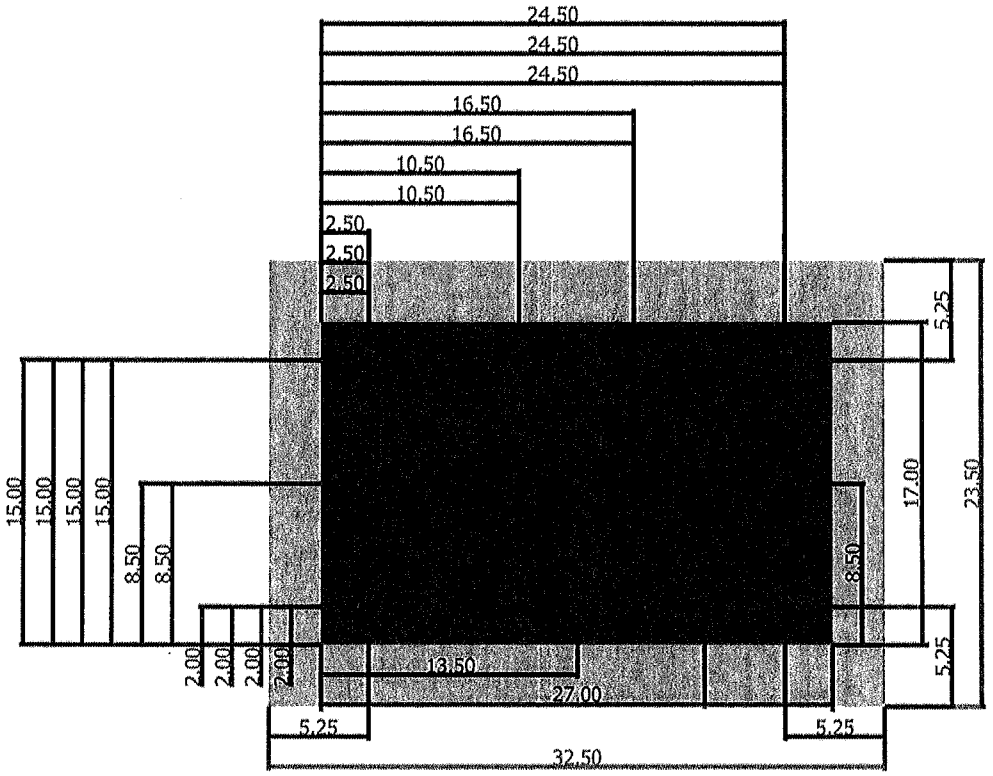
Strength level loads:

N_{ua} [lb]:	19760
V_{uax} [lb]:	1860
V_{uay} [lb]:	-3600
M_{ux} [ft-lb]:	210784
M_{uy} [ft-lb]:	0
M_{uz} [ft-lb]:	0

<Figure 1>



<Figure 2>

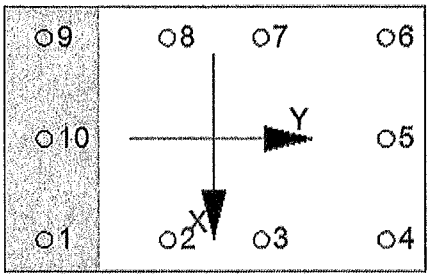


3. Resulting Anchor Forces

Anchor	Tension load, N_{ua} (lb)	Shear load x, V_{uax} (lb)	Shear load y, V_{uay} (lb)	Shear load combined, $\sqrt{(V_{uax})^2+(V_{uay})^2}$ (lb)
1	0.0	186.0	-360.0	405.2
2	7481.4	186.0	-360.0	405.2
3	17736.3	186.0	-360.0	405.2
4	31409.5	186.0	-360.0	405.2
5	31409.5	186.0	-360.0	405.2
6	31409.5	186.0	-360.0	405.2
7	17736.3	186.0	-360.0	405.2
8	7481.4	186.0	-360.0	405.2
9	0.0	186.0	-360.0	405.2
10	0.0	186.0	-360.0	405.2
Sum	144664.1	1860.0	-3600.0	4052.1

Maximum concrete compression strain (‰): 0.55
Maximum concrete compression stress (psi): 2400
Resultant tension force (lb): 144664
Resultant compression force (lb): 124904
Eccentricity of resultant tension forces in x-axis, e'_{Nx} (inch): 2.88
Eccentricity of resultant tension forces in y-axis, e'_{Ny} (inch): 0.00
Eccentricity of resultant shear forces in x-axis, e'_{Vx} (inch): 0.00
Eccentricity of resultant shear forces in y-axis, e'_{Vy} (inch): 0.00

<Figure 3>



4. Steel Strength of Anchor in Tension (Sec. 17.4.1)

N_{sa} (lb)	ϕ	ϕN_{sa} (lb)
75750	0.75	56813

6. Pullout Strength of Anchor in Tension (Sec. 17.4.3)

$\phi N_{pn} = \phi \Psi_{c,P} N_p = \phi \Psi_{c,P} 8 A_{brg} f'_c$ (Sec. 17.3.1, Eq. 17.4.3.1 & 17.4.3.4)

$\Psi_{c,P}$	A_{brg} (in^2)	f'_c (psi)	ϕ	ϕN_{pn} (lb)
1.0	1.50	5000	0.70	42028

8. Steel Strength of Anchor in Shear (Sec. 17.5.1)

V_{sa} (lb)	ϕ_{grout}	ϕ	$\phi_{grout}\phi V_{sa}$ (lb)
45450	0.8	0.65	23634

10. Concrete Pryout Strength of Anchor in Shear (Sec. 17.5.3)

$\phi V_{opg} = \phi k_{cp} N_{obg} = \phi k_{cp}(A_{Nc}/A_{Nco})\Psi_{ec,N}\Psi_{ed,N}\Psi_{c,N}\Psi_{cp,N}N_b$ (Sec. 17.3.1 & Eq. 17.5.3.1b)

k_{cp}	A_{Nc} (in²)	A_{Nco} (in²)	$\Psi_{ec,N}$	$\Psi_{ed,N}$	$\Psi_{c,N}$	$\Psi_{cp,N}$	N_b (lb)	ϕ	ϕV_{opg} (lb)
2.0	735.00	110.25	1.000	1.000	1.000	1.000	9128	0.70	85197

11. Results

Interaction of Tensile and Shear Forces (Sec. R17.6)

Tension	Factored Load, N_{ua} (lb)	Design Strength, ϕN_n (lb)	Ratio	Status
Steel	31410	56813	0.55	Pass
Pullout	**31410**	**42028**	**0.75**	**Pass (Governs)**

Shear	Factored Load, V_{ua} (lb)	Design Strength, ϕV_n (lb)	Ratio	Status
Steel	405	23634	0.02	Pass
Pryout	**4052**	**85197**	**0.05**	**Pass (Governs)**

Interaction check	$(N_{ua}/\phi N_{ua})^{5/3}$	$(V_{ua}/\phi V_{ua})^{5/3}$	Utilization Ratio	Permissible	Status
Sec. R17.6	0.62	0.01	62.2%	1.0	Pass

1"Ø Heavy Hex Bolt, F1554 Gr. 105 with hef = 13.000 inch meets the selected design criteria.

12. Warnings

- Minimum spacing and edge distance requirement of 6da per ACI 318 Sections 17.7.1 and 17.7.2 for torqued cast-in-place anchor is waived per designer option.

- Concrete breakout strength in tension has not been evaluated against applied tension load(s) per designer option. Refer to ACI 318 Section 17.3.2.1 for conditions where calculations of the concrete breakout strength may not be required.

- Concrete breakout strength in shear has not been evaluated against applied shear load(s) per designer option. Refer to ACI 318 Section 17.3.2.1 for conditions where calculations of the concrete breakout strength may not be required.

- Designer must exercise own judgement to determine if this design is suitable.

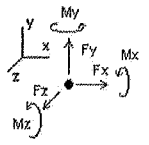
RAM Elements

Current Date: 6/4/2025 5:23 PM
Units system: English

Analysis result

Nodes

Reactions



Direction of positive forces and moments

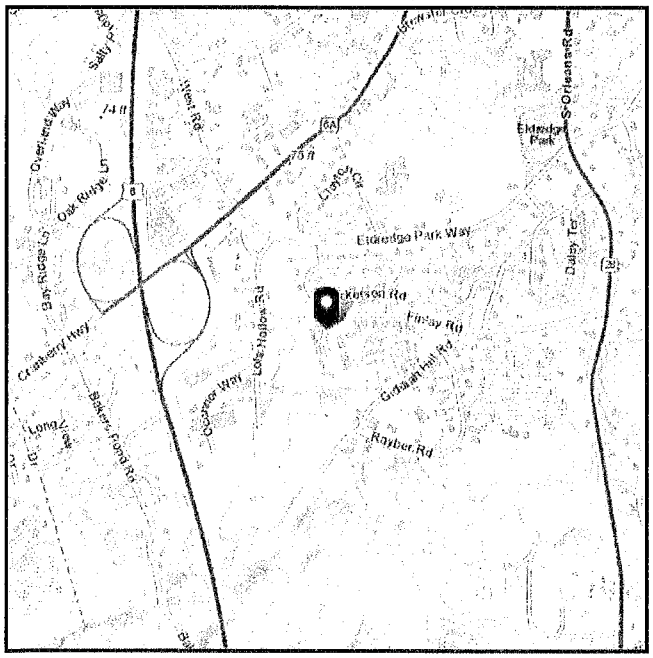
Node	Forces [Kip] FX	FY	FZ	Moments [Kip*ft] MX	MY	MZ
Condition **DL=Dead Load**						
1	0.00000	5.44313	0.00000	0.00000	0.00000	-0.85037
SUM	0.00000	5.44313	0.00000	0.00000	0.00000	-0.85037
Condition **CL=Collateral Load**						
1	0.00000	4.59481	0.00000	0.00000	0.00000	0.03401
SUM	0.00000	4.59481	0.00000	0.00000	0.00000	0.03401

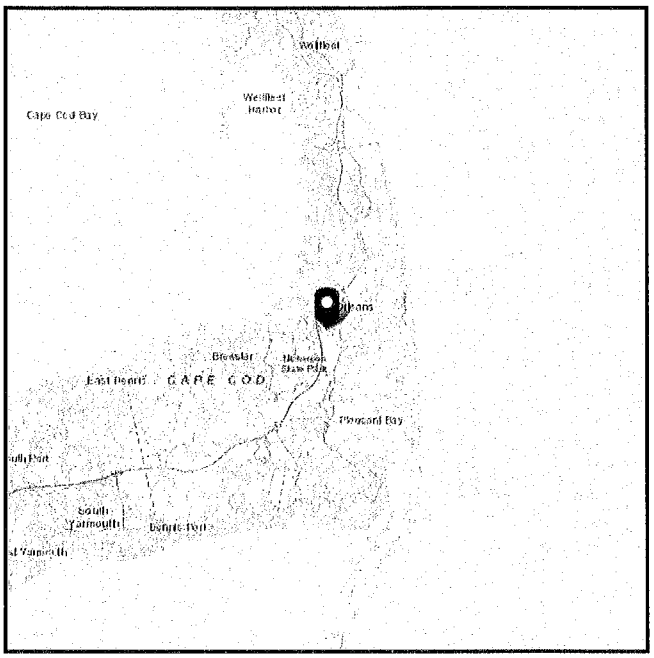
ASCE Hazards Report

Address:
1 Commerce Dr
Orleans, Massachusetts
02653

Standard: ASCE/SEI 7-16
Risk Category: II
Soil Class: E - Soft Clay Soil

Latitude: 41.776922
Longitude: -69.996502
Elevation: 92.82566102160216 ft (NAVD 88)





ASCE
AMERICAN SOCIETY OF CIVIL ENGINEERS

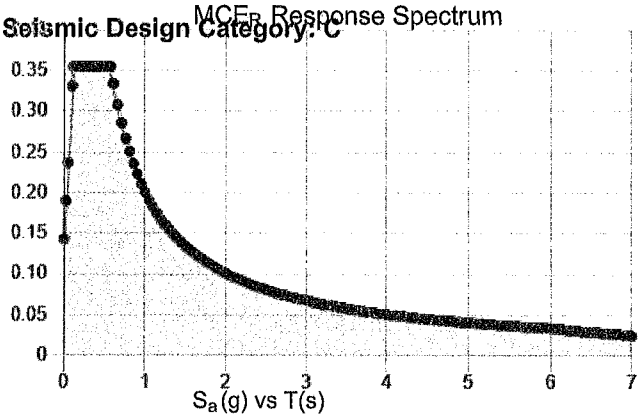
Seismic

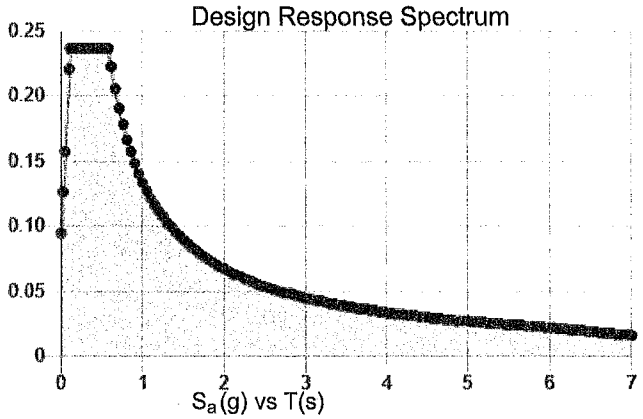
Site Soil Class: E - Soft Clay Soil

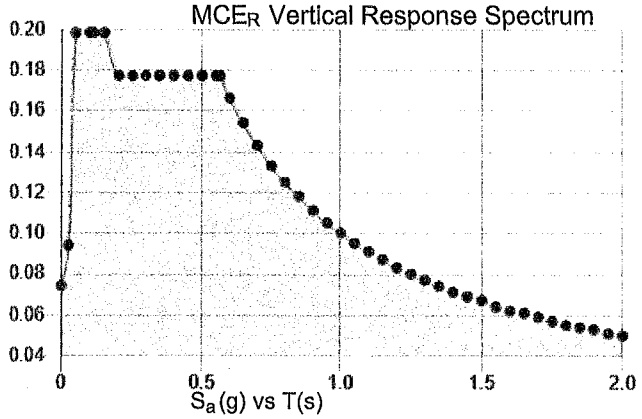
Results:

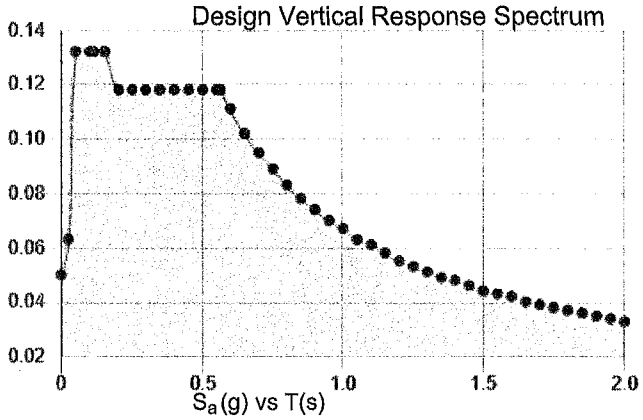
S_S :	0.148	S_{D1} :	0.133
S_1 :	0.048	T_L :	6
F_a :	2.4	PGA :	0.077
F_v :	4.2	PGA_M :	0.184
S_{MS} :	0.354	F_{PGA} :	2.4
S_{M1} :	0.2	I_e :	1
S_{DS} :	0.236	C_v :	0.7

Seismic Design Category: C









Data Accessed: **Fri Jun 13 2025**

Date Source:

USGS Seismic Design Maps based on ASCE/SEI 7-16 and ASCE/SEI 7-16 Table 1.5-2. Additional data for site-specific ground motion procedures in accordance with ASCE/SEI 7-16 Ch. 21 are available from USGS.

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Seismic Design

Equivalent Lateral Force Procedure

DL (kips)	10.05	Frame Weight (From Analysis)
Pf (psf)	25	Flat Roof Snow Contribution
W (kips)	10.05	Effective Seismic Weight
Sds (g)	0.236	Design Spectral Response Parameter
R	1.25	Response Modification Factor
Ie	1	Importance Factor
TL	6	Long Period Transition Period
Sd1 (g)	0.133	Spectral Response Parameter, T=1.0
S1 (g)	0.048	Maximum Earthquake Spectral Parameter
hn	23	Structural Height (11.2)
Cu	1.6	
Ct	0.02	To be inserted from Table 12.8-2
x	0.75	
Ta	0.21	Approximate Fundamental Time (Eq. 12.8-7)
Tgiven		
T	0.21	Fundamental Time (12.8.2)
CS	0.189	Seismic Response Coefficient Initial (12.8-2)
Cs Check	0.507	Seismic Response Coefficient Not to Exceed
Cs	0.189	Seismic Response Coefficient Final
V	1.86	Seismic Base Shear (kips)

Table 12.2-1 (*Continued*)

Seismic Force-Resisting System	ASCE 7 Section Where Detailing Requirements Are Specified	Response Modification Coefficient, R[a]	Overstrength Factor, Ω_0[g]	Deflection Amplification Factor, C_d[b]	Structural System Limitations Including Structural Height, h_n (ft) Limits[c] Seismic Design Category B	C	D[d]	E[d]	F[e]
G. CANTILEVERED COLUMN SYSTEMS DETAILED TO CONFORM TO THE REQUIREMENTS FOR:	12.2.5.2								
1. Steel special cantilever column systems	14.1	2½	1¼	2½	35	35	35	35	35
2. Steel ordinary cantilever column systems	14.1	1¼	1¼	1¼	35	35	NP[i]	NP[i]	NP[i]
3. Special reinforced concrete moment frames[n]	12.2.5.5 and 14.2	2½	1¼	2½	35	35	35	35	35
4. Intermediate reinforced concrete moment frames	14.2	1½	1¼	1½	35	35	NP	NP	NP
5. Ordinary reinforced concrete moment frames	14.2	1	1¼	1	35	NP	NP	NP	NP
6. Timber frames	14.5	1½	1½	1½	35	35	35	NP	NP
H. STEEL SYSTEMS NOT SPECIFICALLY DETAILED FOR SEISMIC RESISTANCE, EXCLUDING CANTILEVER COLUMN SYSTEMS	14.1	3	3	3	NL	NL	NP	NP	NP

[a]Response modification coefficient, *R*, for use throughout the standard. Note *R* reduces forces to a strength level, not an allowable stress level.
[b]Deflection amplification factor, C_d, for use in Sections 12.8.6, 12.8.7, and 12.9.2.
[c]NL = Not Limited and NP = Not Permitted. For metric units use 30.5 m for 100 ft and use 48.8 m for 160 ft.
[d]See Section 12.2.5.4 for a description of seismic force-resisting systems limited to buildings with a structural height, h_n, of 240 ft (73.2 m) or less.
[e]See Section 12.2.5.4 for seismic force-resisting systems limited to buildings with a structural height, h_n, of 160 ft (48.8 m) or less.
[f]Ordinary moment frame is permitted to be used in lieu of intermediate moment frame for Seismic Design Categories B or C.
[g]Where the tabulated value of the overstrength factor, Ω_0, is greater than or equal to 2½, Ω_o is permitted to be reduced by subtracting the value of 1/2 for structures with flexible diaphragms.
[h]See Section 12.2.5.7 for limitations in structures assigned to Seismic Design Categories D, E, or F.
[i]See Section 12.2.5.6 for limitations in structures assigned to Seismic Design Categories D, E, or F.
[j]Steel ordinary concentrically braced frames are permitted in single-story buildings up to a structural height, h_n, of 60 ft (18.3 m) where the dead load of the roof does not exceed 20 psf (0.96 kN/m^2) and in penthouse structures.
[k]An increase in structural height, h_n, to 45 ft (13.7 m) is permitted for single story storage warehouse facilities.
[l]In Section 2.2 of ACI 318. A shear wall is defined as a structural wall.
[m]In Section 2.2 of ACI 318. The definition of "special structural wall" includes precast and cast-in-place construction.
[n]In Section 2.2 of ACI 318. The definition of "special moment frame" includes precast and cast-in-place construction.
[o]Alternately, the seismic load effect with overstrength, E_{mh}, is permitted to be based on the expected strength determined in accordance with AISI S110.
[p]Cold-formed steel – special bolted moment frames shall be limited to one-story in height in accordance with AISI S110.

2. Where provision for partitions is required by Section 4.2.2 in the floor load design, the actual partition weight or a minimum weight of 10 psf (0.48 kN/m^2) of floor area, whichever is greater.
3. Total operating weight of permanent equipment.
4. Where the flat roof snow load, P_f, exceeds 30 psf (1.44 kN/m^2), 20 percent of the uniform design snow load, regardless of actual roof slope.
5. Weight of landscaping and other materials at roof gardens and similar areas.

12.7.3 Structural Modeling

A mathematical model of the structure shall be constructed for the purpose of determining member forces and structure displacements resulting from applied loads and any imposed displacements or P-delta effects. The model shall include the stiffness and strength of elements that are significant to the distribution of forces and deformations in the structure and represent the spatial distribution of mass and stiffness throughout the structure.

In addition, the model shall comply with the following:

a. Stiffness properties of concrete and masonry elements shall consider the effects of cracked sections.
b. For steel moment frame systems, the contribution of panel zone deformations to overall story drift shall be included.

Structures that have horizontal structural irregularity Type 1a, 1b, 4, or 5 of Table 12.3-1 shall be analyzed using a 3-D representation. Where a 3-D model is used, a minimum of three dynamic degrees of freedom consisting of translation in two orthogonal plan directions and rotation about the vertical axis shall be included at each level of the structure. Where the diaphragms have not been classified as rigid or flexible in accordance with Section 12.3.1, the model shall include representation of the diaphragm's stiffness characteristics and such additional dynamic degrees of freedom as are required to account for the participation of the diaphragm in the structure's dynamic response.

EXCEPTION: Analysis using a 3-D representation is not required for structures with flexible diaphragms that have Type 4 horizontal structural irregularities.

12.7.4 Interaction Effects

Moment-resisting frames that are enclosed or adjoined by elements that are more rigid and not considered to be part of the seismic force-resisting system shall be designed so that the action or failure of those elements will not impair the vertical load and seismic force-resisting capability of the frame. The design shall provide for the effect of these rigid elements on the structural system at structural deformations corresponding to the design story drift (Δ) as determined in Section 12.8.6. In addition, the effects of these elements shall be considered where determining whether a structure has one or more of the irregularities defined in Section 12.3.2.

12.8 EQUIVALENT LATERAL FORCE PROCEDURE

12.8.1 Seismic Base Shear

The seismic base shear, V, in a given direction shall be determined in accordance with the following equation:

$$V = C_s W \qquad (12.8\text{-}1)$$

where

C_s = the seismic response coefficient determined in accordance with Section 12.8.1.1
W = the effective seismic weight per Section 12.7.2

12.8.1.1 Calculation of Seismic Response Coefficient

The seismic response coefficient, C_s, shall be determined in accordance with Eq. 12.8-2.

$$C_s = \frac{S_{DS}}{\left(\frac{R}{I_e}\right)} \qquad (12.8\text{-}2)$$

where

S_{DS} = the design spectral response acceleration parameter in the short period range as determined from Section 11.4.4 or 11.4.7
R = the response modification factor in Table 12.2-1
I_e = the importance factor determined in accordance with Section 11.5.1

The value of C_s computed in accordance with Eq. 12.8-2 need not exceed the following:

$$C_s = \frac{S_{D1}}{T\left(\frac{R}{I_e}\right)} \quad \text{for} \quad T \le T_L \qquad (12.8\text{-}3)$$

$$C_s = \frac{S_{D1}T_L}{T^2\left(\frac{R}{I_e}\right)} \quad \text{for} \quad T > T_L \qquad (12.8\text{-}4)$$

C_s shall not be less than

$$C_s = 0.044 S_{DS} I_e \geq 0.01 \qquad (12.8\text{-}5)$$

In addition, for structures located where S_1 is equal to or greater than $0.6g$, C_s shall not be less than

$$C_s = 0.5 S_1/(R/I_e) \qquad (12.8\text{-}6)$$

where I_e and R are as defined in Section 12.8.1.1 and

S_{D1} = the design spectral response acceleration parameter at a period of 1.0 s, as determined from Section 11.4.4 or 11.4.7

T = the fundamental period of the structure(s) determined in Section 12.8.2

T_L = long-period transition period(s) determined in Section 11.4.5

S_1 = the mapped maximum considered earthquake spectral response acceleration parameter determined in accordance with Section 11.4.1 or 11.4.7

12.8.1.2 Soil Structure Interaction Reduction

A soil structure interaction reduction is permitted where determined using Chapter 19 or other generally accepted procedures approved by the authority having jurisdiction.

12.8.1.3 Maximum S_s *Value in Determination of* C_s

For regular structures five stories or less above the base as defined in Section 11.2 and with a period, T, of 0.5 s or less, C_s is permitted to be calculated using a value of 1.5 for S_S.

12.8.2 Period Determination

The fundamental period of the structure, T, in the direction under consideration shall be established using the structural properties and deformational characteristics of the resisting elements in a properly substantiated analysis. The fundamental period, T, shall not exceed the product of the coefficient for upper limit on calculated period (C_u) from Table 12.8-1 and the approximate fundamental period, T_a, determined in accordance with Section 12.8.2.1. As an alternative to performing an analysis to determine the fundamental period, T, it is permitted to use the approximate building period, T_a, calculated in accordance with Section 12.8.2.1, directly.

12.8.2.1 Approximate Fundamental Period

The approximate fundamental period (T_a), in s, shall be determined from the following equation:

$$T_a = C_t h_n^x \qquad (12.8\text{-}7)$$

where h_n is the structural height as defined in Section 11.2 and the coefficients C_t and x are determined from Table 12.8-2.

Alternatively, it is permitted to determine the approximate fundamental period (T_a), in s, from the following equation for structures not exceeding 12 stories above the base as defined in Section 11.2 where the seismic force-resisting system consists

Table 12.8-1 Coefficient for Upper Limit on Calculated Period

Design Spectral Response Acceleration Parameter at 1 *s*, S_{D1}	Coefficient C_u
≥ 0.4	1.4
0.3	1.4
0.2	1.5
0.15	1.6
≤ 0.1	1.7

Table 12.8-2 Values of Approximate Period Parameters C_t and x

Structure Type	C_t	x
Moment-resisting frame systems in which the frames resist 100% of the required seismic force and are not enclosed or adjoined by components that are more rigid and will prevent the frames from deflecting where subjected to seismic forces:		
Steel moment-resisting frames	0.028 (0.0724)[a]	0.8
Concrete moment-resisting frames	0.016 (0.0466)[a]	0.9
Steel eccentrically braced frames in accordance with Table 12.2-1 lines B1 or D1	0.03 (0.0731)[a]	0.75
Steel buckling-restrained braced frames	0.03 (0.0731)[a]	0.75
All other structural systems	0.02 (0.0488)[a]	0.75

[a]Metric equivalents are shown in parentheses.

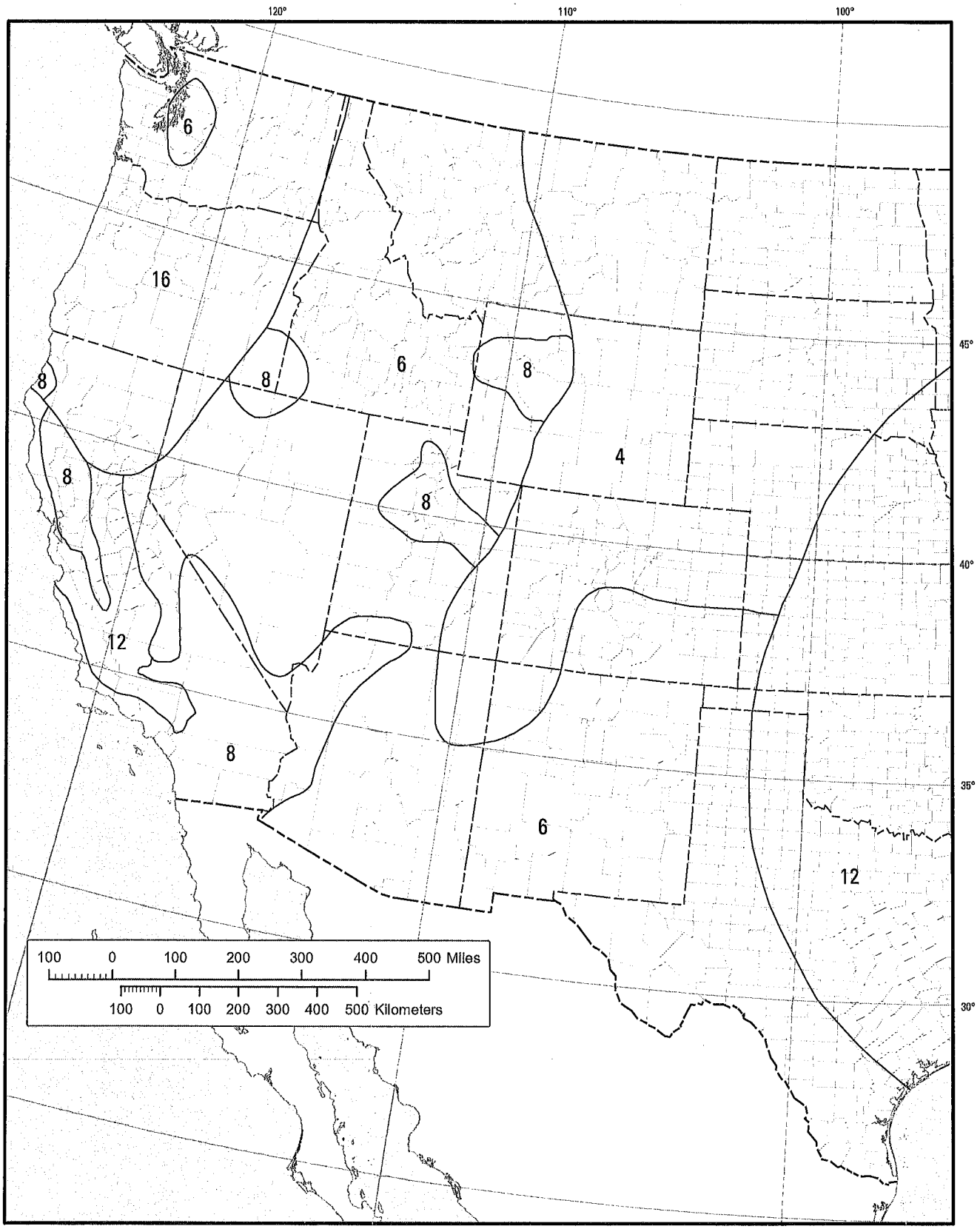


FIGURE 22-14 Mapped Long-Period Transition Period, T_L (s), for the Conterminous United States

continues

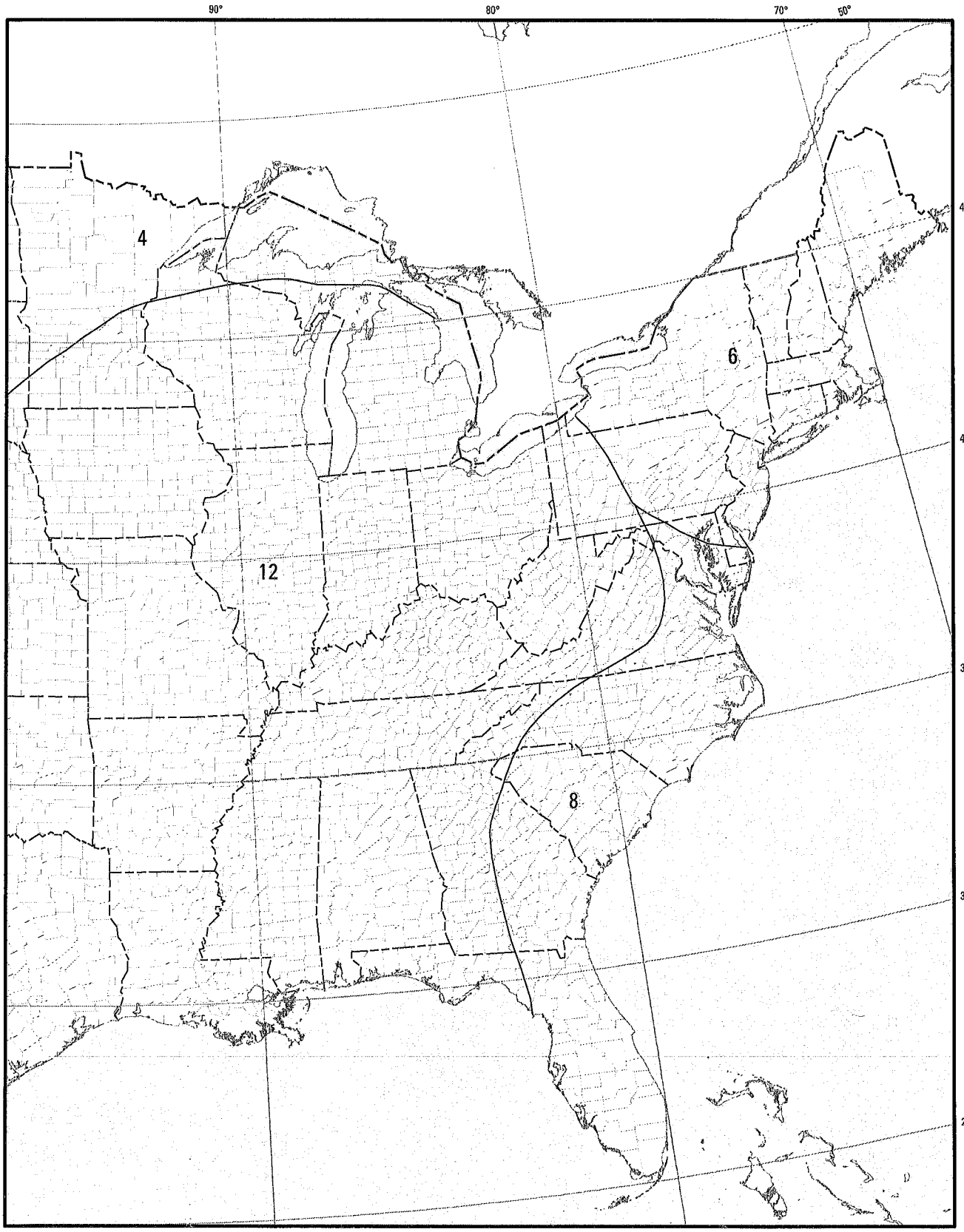


FIGURE 22-14 (*Continued*). Mapped Long-Period Transition Period, T_L (s), for the Conterminous United States

SITE LOCATION:
1 COMMERCE DRIVE
ORLEANS, MA 02653

PROJECT NUMBER: SML.25.047

INDEX OF DRAWINGS
S-1 COVER SHEET

REFERENCE DRAWINGS
SOLAR MOUNTS DRAWINGS 1-11

SERVINSKY ENGINEERING & ASSOCIATES IS NOT RESPONSIBLE FOR DESIGN OR CERTIFICATION OF SOLAR PANELS.

STRUCTURAL DESIGN LOADS
HANWHA QCELLS Q.TRON XL-G2 PANELS
590W PANELS: 96.90"x44.60"x1.38": 78.0Lbs
MASSACHUSETTS BUILDING CODE 780 CRM
IBC 2021; ASCE 7-16;
RISK CATEGORY II
WIND SPEED Vult = 130 MPH
Vasd = 100 MPH
WIND EXPOSURE B
Kh VARIES PER CALCS
Kd = 0.85
Kzt= 1.0 FLAT TERRAIN
q = 22.43 psf WIND PRESSURE @ Vult

GROUND SNOW, Pg = 25 psf
Ct = 1.2
Ce = 0.9
I = 1.0
FLAT ROOF SNOW, Pf = 25 psf (SPECIFIED)

ROOF LIVE LOAD = 12 psf

Seismic Criteria:
Site Class E
S_s = 0.148g
S_1 = 0.048g
Sds = 0.236g
Sd1 = 0.133g

Seismic Design Category C

GENERAL

1. THE SPECIAL INSPECTION INSPECTOR SHALL:
   a. BE A QUALIFIED PERSON WHO SHALL DEMONSTRATE COMPETENCE, TO THE SATISFACTION OF THE BUILDING OFFICIAL, FOR INSPECTION OF THE PARTICULAR TYPE OF CONSTRUCTION OR OPERATION REQUIRING SPECIAL INSPECTION.
   b. REVIEW MATERIALS AND WORK FOR GENERAL COMPLIANCE WITH IBC REFERENCES AND REFERENCED STANDARDS.
   c. KEEP RECORDS OF INSPECTION.
   d. FURNISH INSPECTION REPORTS TO THE BUILDING OFFICIAL, AND TO THE REGISTERED DESIGN PROFESSIONAL IN RESPONSIBLE CHARGE AT THE FREQUENCY INDICATED.
   e. REPORTS SHALL INDICATE THAT WORK INSPECTED WAS DONE IN CONFORMANCE TO APPROVED CONSTRUCTION DOCUMENTS.
   f. DISCREPANCIES SHALL BE BROUGHT TO THE IMMEDIATE ATTENTION OF THE CONTRACTOR FOR CORRECTION.
   g. IF THE DISCREPANCIES ARE NOT CORRECTED, THE DISCREPANCIES SHALL BE BROUGHT TO THE ATTENTION OF THE BUILDING OFFICIAL AND TO THE REGISTERED DESIGN PROFESSIONAL IN RESPONSIBLE CHARGE PRIOR TO THE COMPLETION OF THAT PHASE OF WORK.
   h. SUBMIT A FINAL REPORT OF INSPECTIONS DOCUMENTING REQUIRED SPECIAL INSPECTIONS AND CORRECTION OF ANY DISCREPANCIES NOTED IN THE INSPECTIONS.

2. ALL IBC REFERENCES ARE TO THE INTERNATIONAL BUILDING CODE 2021.

3. THE CONTRACTOR SHALL PROVIDE TIMELY NOTICE TO THE SPECIAL INSPECTOR AND SUFFICIENT TIME FOR THE INSPECTOR TO PERFORM THEIR INSPECTIONS.

4. THE FOLLOWING ITEMS SHALL REQUIRE SPECIAL INSPECTIONS IN ACCORDANCE WITH IBC CHAPTER 17 AND THE JURISDICTION REQUIREMENTS. CONFIRM ANY ADDITIONAL SPECIAL INSPECTION ITEMS WITH THE BUILDING INSPECTOR AT PRE-CONSTRUCTION MEETING.

   1. SOILS COMPLIANCE, PRIOR TO FOUNDATION INSPECTION. SEE TABLE 1705.6 THIS SHEET.
   2. CONSTRUCTION OF CAST-IN-PLACE CONCRETE FOOTINGS. SEE TABLES 1705.3 THIS SHEET.
   3. HIGH STRENGTH BOLTS. SEE TABLES N5 THIS SHEET.

NO ADDITIONAL SPECIAL INSPECTION REQUIREMENTS ARE NEEDED FOR SEISMIC OR WIND RESISTANCE.

SOILS (IBC 1705.6)

	ITEMS	CONTINUOUS	PERIODIC	N/A
1	VERIFY MATERIALS BELOW SHALLOW FOUNDATIONS ARE ADEQUATE TO ACHIEVE THE DESIGN BEARING CAPACITY		X	
2	VERIFY EXCAVATIONS ARE EXTENDED TO PROPER DEPTH AND HAVE REACHED PROPER MATERIAL		X	
3	PERFORM CLASSIFICATIONS AND TESTING OF COMPACTED FILL MATERIAL		X	
4	VERIFY USE OF PROPER MATERIALS, DENSITIES, AND LIFT THICKNESS DURING PLACEMNT AND COMPACTION OF COMPACTED FILL	X		
5	PRIOR TO PLACEMENT OF COMPACTED FILL, INSPECT SUBGRADE AND VERIFY THAT SITE HAS BEEN PREPARED PROPERLY		X	

SPECIFICATIONS

A. STRUCTURAL STEEL

1. HSS Sections ASTM A500 Grade C
2. W Sections ASTM A992 Gr 50
3. Purlins: Shape per drawings; cold formed steel. ASTM A570 or A607, 80 ksi
4. Field welding not allowed, shop welding to be E70XX Electrodes, AWS D1.1.
5. See Solar Mounts, LLC sheets for bolt sizes
6. Paint or Hot Dipped Galvanize all steel except rebar. For painted surfaces, prime & finish paint structural steel to Owner's color selection.

B. GEOTECHNICAL

1. Soil vertical bearing capacity = 1,500 psf net per geotechnical report by Weston & Sampson dated April 11, 2025. Foundations shall bear on till or rock. Over-excavate and backfill so footings are supported on minimum 1' structural fill over properly prepared till or rock.
2. All site preparation, excavation, subgrade preparation and placement of engineered fill should follow the recommendations provided in the geotechnical report.
3. Earthwork and subgrades to be observed and evaluated by geotechnical engineer prior to construction. Proof rolling and re-compaction of subgrade to be performed under the continuous observation of the geotechnical engineer..

C. CONCRETE

1. Minimum 28 day compressive strength = 5,000 psi
2. Maximum water-cement ratio of 0.40
3. Reinforcing Steel – Grade 60 bars
4. Minimum concrete cover for reinforcing bars shall be 3" min for concrete cast against grade, 1½" all other areas.
5. Design Data:
   Maximum aggregate size – ¾ inch
   Air Content 6% ± 2%
   Maximum Slump 6"
6. Production and placement shall be in accordance with ACI 301. Submit mix design to Engineer of Record for Approval.

CAST-IN-PLACE (IBC 1705.3)

	ITEMS		CONTINUOUS	PERIODIC	N/A	REFERENCED STANDARD
1	INSPECT REINFORMENT, INCLUDING PRESTRESSING TENDONS, AND VERIFY PLACEMENT			X		ACI 318: CH. 20, 25.2, 25.3, 26.6.1-26.6.3
2	REINFORCING BAR WELDING:	VERIFY WELDABILITY IF REINFORCING BARS OTHER THAT ASTM A706			X	AWS D1.4 ACI318: 26.6.4
		INSPECT SINGLE-PASS FILLET WELDS, MAXIMUM 5/16"			X	
		INSPECT ALL OTHER WELDS			X	
3	INSPECT ANCHORS CAST IN CONCRETE			X		ACI 318: 17.8.2
4	INSPECT ANCHORS POST-INSTALLED IN HARDENED CONCRETE MEMBERS:	ADHESIVE ANCHORS			X	ACI 318: 17.8.2.4
		MECHANICAL ANCHORS			X	ACI 318: 17.8.2
5	VERIFY USE OF REQUIRED DESIGN MIX			X		ACI 318: CH. 19, 25.4.3, 26.4.4
6	PRIOR TO CONCRETE PLACEMENT, FABRICATE SPECIMENS FOR STRENGTH TESTS, PERFORM SLUMP AND AIR CONTENT TESTS, AND DETERMINE THE TEMPERATURE OF THE CONCRETE		X			ASTM C172 ASTM C31 ACI 318: 26.5, 26.12
7	INSPECT CONCRETE AND SHOTCRETE PLACEMENT FOR PROPER APPLICATION TECHNIQUES				X	ACI 318: 26.5
8	VERIFY MAINTENANCE OF SPECIFIED CURING TEMPEATURE AND TECHNIQUES			X		ACI 318: 26.5.3-26.5.5
9	INSPECT PRESTRESSED CONCRETE FOR:	APPLICATION OF PRESTRESSING FORCES			X	ACI 318: 26.10
		GROUTING OF BONDED PRESTRESSING TENDONS			X	
10	INSPECT ERECTION OF PRECAST CONCRETE MEMBERS				X	ACI 318: 26.9
13	VERIFY IN-SITU CONCRETE STRENGTH, PRIOR TO STRESSING OF TENDONS IN POST-TENSIONED CONCRETE AND PRIOR TO REMOVAL OF SHORES AND FORMS FROM BEAMS AND STRUCTURAL SLABS				X	ACI 318: 26.11.2
14	INSPECT FORMWORK FOR SHAPE, LOCATION, AND DIMENSIONS OF THE CONCRETE MEMBER BEING FORMED			X		ACI 318: 26.11.1.2(b)

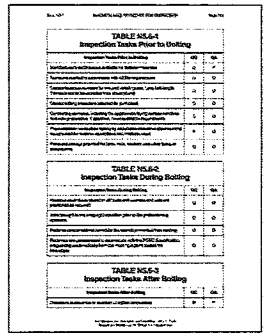


TABLE N5.6-1
Inspection Tasks Prior to Bolting

TABLE N5.6-2
Inspection Tasks During Bolting

TABLE N5.6-3
Inspection Tasks After Bolting

REVISIONS				
BY	REV	DESCRIPTION	DATE	APPROVED
SW	0	ISSUED FOR CONSTRUCTION	09/11/25	RSJ

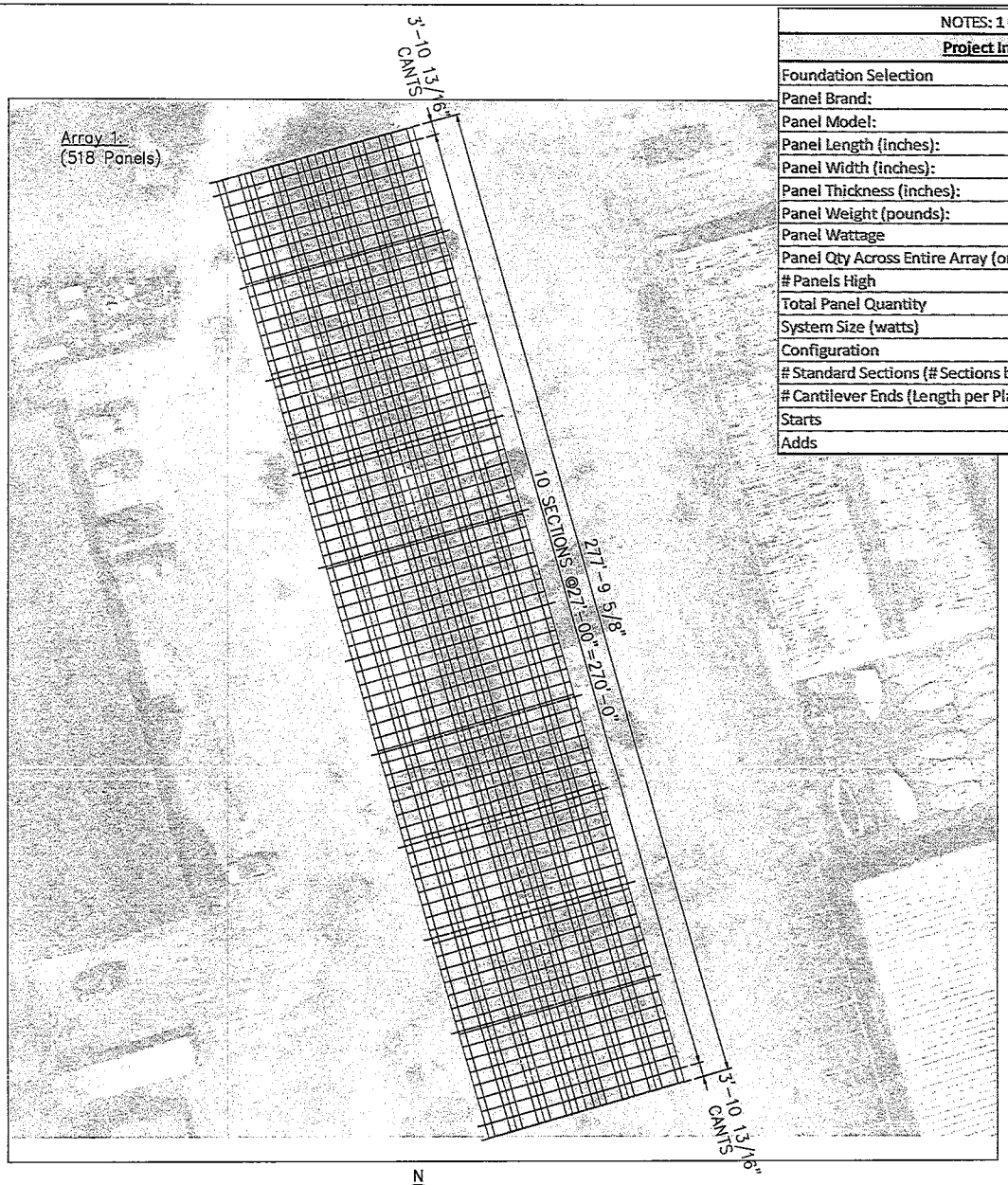
SERVINSKY ENGINEERING & ASSOCIATES
Consulting Structural Engineers
mail@servinskyeng.com
280 Douglas Ave
Holland, MI 49424-6015
(616) 735-1281
Fax (616) 735-6283

SOLAR MOUNTS, LLC
300 WOOLLEY DRIVE
MARSHALL, MI 49068

COVER SHEET
1 COMMERCE DRIVE | ORLEANS, MA
SHEET SIZE: D | SCALE: N.T.S | JOB NO.: SML.25.04 | SHEET NO.: S-1

SML.25.047
SR

Design Loads	
Snow	25 psf
Wind	130 MPH

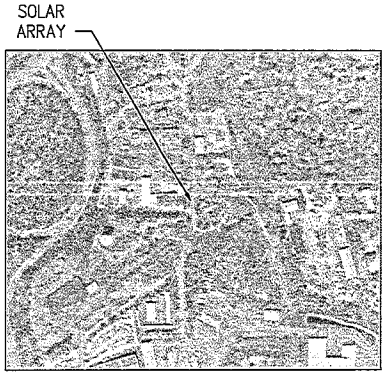


N

Carport Module Layout

SCALE: 1/16" = 1'-0"

NOTES: 1 Commerce			Array 1	Totals
Project Information				
Foundation Selection	Spread		-	-
Panel Brand:	Hanwha QCells		-	-
Panel Model:	Q.TRON XL-G2		-	-
Panel Length (inches):	96.9"		-	-
Panel Width (inches):	44.6"		-	-
Panel Thickness (inches):	1.38"		-	-
Panel Weight (pounds):	78.0 lbs.		-	-
Panel Wattage			590	-
Panel Qty Across Entire Array (one row)			74	-
# Panels High			7	-
Total Panel Quantity			518	518
System Size (watts)			305,620	305,620
Configuration			T-Frame	-
# Standard Sections (# Sections between Posts)			10	10
# Cantilever Ends (Length per Plan)			2	2
Starts			1	1
Adds			9	9



N

Map

NO SCALE

Revision:	Date:	Engineer:	Revision Description:
A	6/11/2025	AStiles	Initial Preliminary Design

MATERIAL:

FINISH:

WEIGHT:

DO NOT SCALE DRAWING

Solar Mounts setbacks are received from a third party and not responsible for third party surveys and electrical drawings. All CAD related files are approximations and only to be used as a reference.

SOLAR MOUNTS LLC

TITLE:

TOLERANCES: UNLESS OTHERWISE SPECIFIED:

ANGULAR: +/- 1°
X = +/- .05
XX = +/- .025
XXX = +/- .005

SIZE: D

PART NUMBER:

SCALE:

SOLAR MOUNTS LLC

Phone: 844-757-7225

Address: 300 Woolley Drive Marshall, MI 49068

Product: Solar Carports

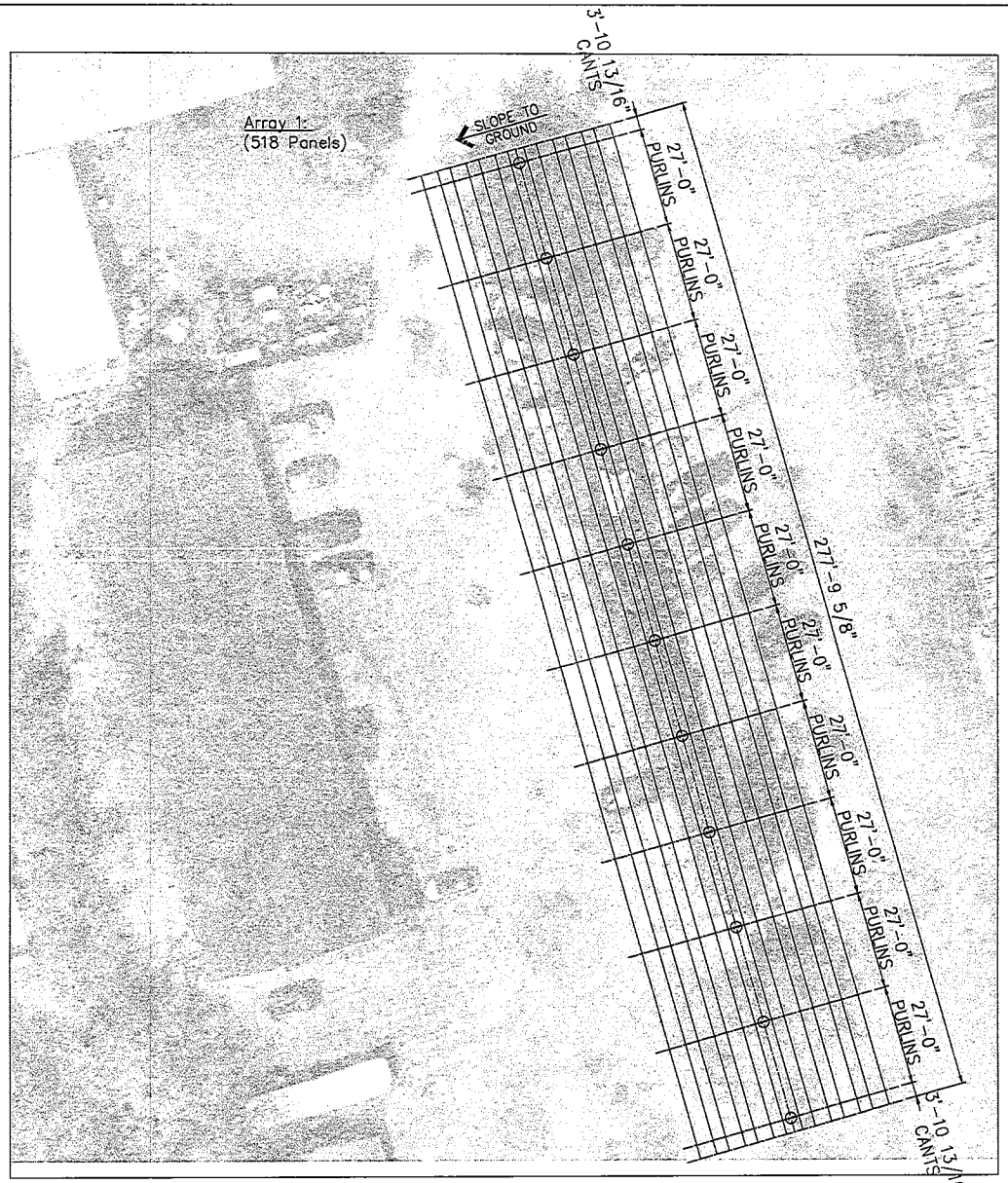
Company: My Generation Energy

Project Name / Title: 1 Commerce – Carport Standard Details

Location: 1 Commerce Dr. | Orleans, MA 02653

Date: 6/11/2025

Page: 1



N

Truss / Post Layout
SCALE: 1/16" = 1'-0"

Revision:	Date:	Engineer:	Revision Description:
A	6/11/2025	AStiles	Initial Preliminary Design

MATERIAL:
FINISH:
WEIGHT:

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TOLERANCES:
UNLESS OTHERWISE SPECIFIED:
ANGULAR: +/- 1°
X = +/- .05
XX = +/- .025
XXX = +/- .005

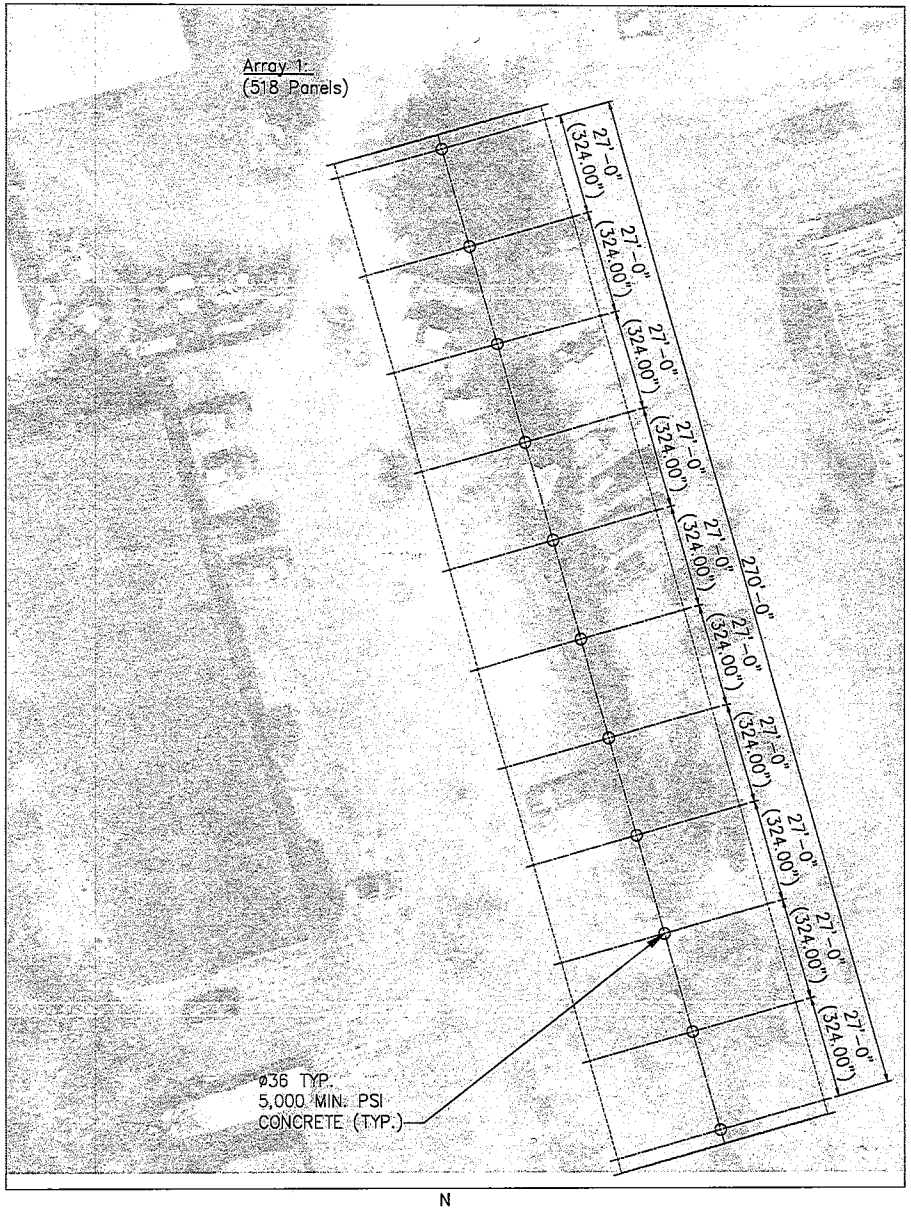
SOLAR MOUNTS LLC
TITLE:
SIZE: D
PART NUMBER:
SCALE:

SOLAR MOUNTS LLC
Phone: 844-757-7225
Address: 300 Woolley Drive Marshall, MI 49068

Product: Solar Carports

Company: My Generation Energy
Project Name / Title: 1 Commerce – Carport Standard Details
Location: 1 Commerce Dr. | Orleans, MA 02653

Date: 6/11/2025



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Foundation Layout
SCALE: 1/16" = 1'-0"

Revision:	Date:	Engineer:	Revision Description:
A	6/11/2025	AStiles	Initial Preliminary Design

MATERIAL:
FINISH:
WEIGHT:
DO NOT SCALE DRAWING

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TOLERANCES:
ANGULAR: +/- 1°
X = +/- .05
XX = +/- .025
XXX = +/- .005

SOLAR MOUNTS LLC
TITLE:
SIZE: D
PART NUMBER:
SCALE:

SOLAR MOUNTS LLC

Phone:
844-757-7225
Address:
300 Woolley Drive
Marshall, MI 49068

Product:
Solar
Carports

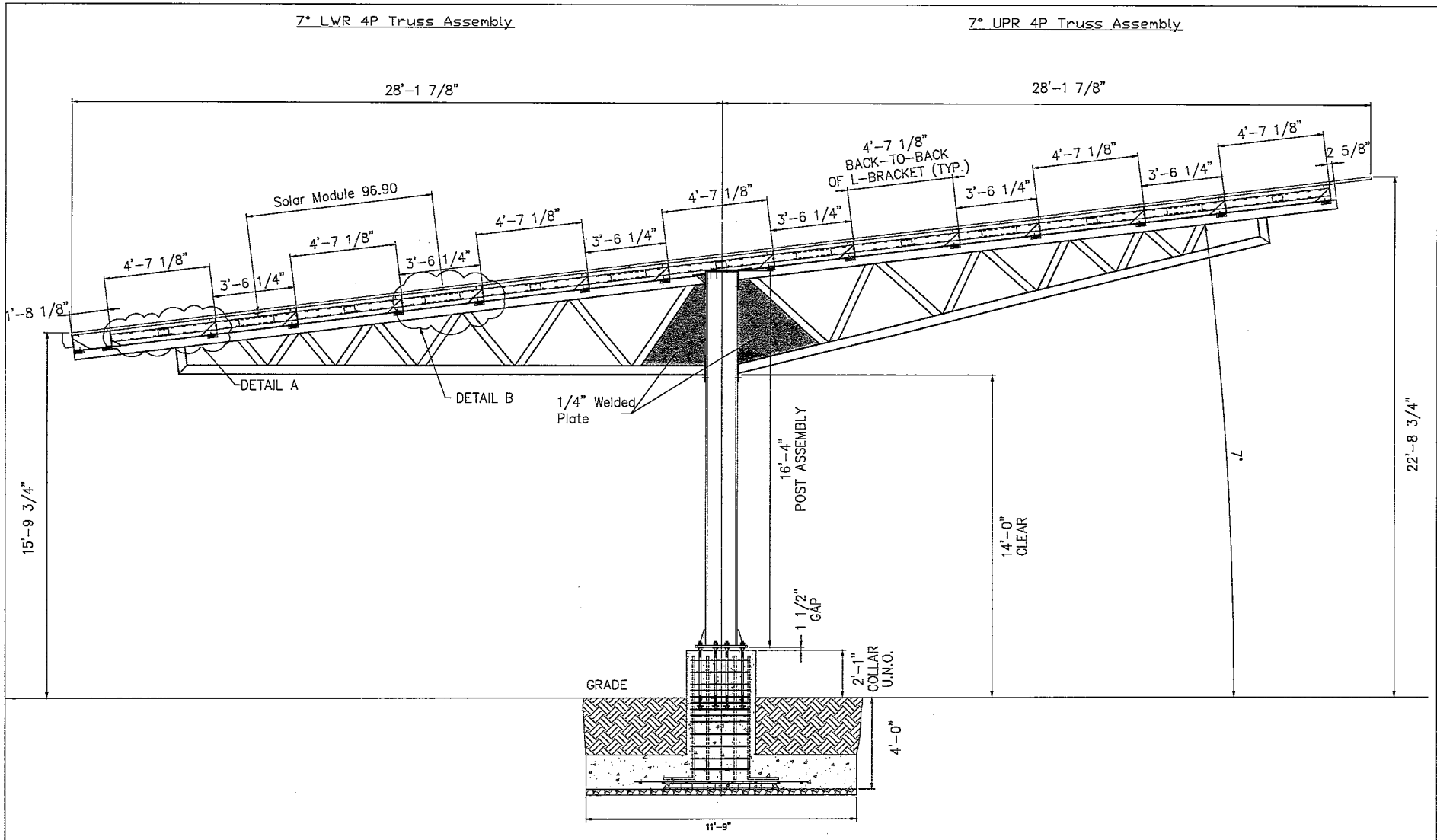
Company:
My Generation Energy

Project Name / Title:
1 Commerce – Carport Standard Details

Location:
1 Commerce Dr. | Orleans, MA 02653

Date:
6/11/2025

Page:
3



Array 1
7-High (3.5+3.5) T-Frame Section
SCALE: 1/2" = 1'-0"

SOLAR MOUNTS LLC

Solar Mounts setbacks are received from a third party and not responsible for third party surveys and electrical drawings. All CAD related files are approximations and only to be used as a reference.

ANGULAR: +/- 1°
X = +/- .05
XX = +/- .025
XXX = +/- .005

SIZE D

SOLAR MOUNTS LLC

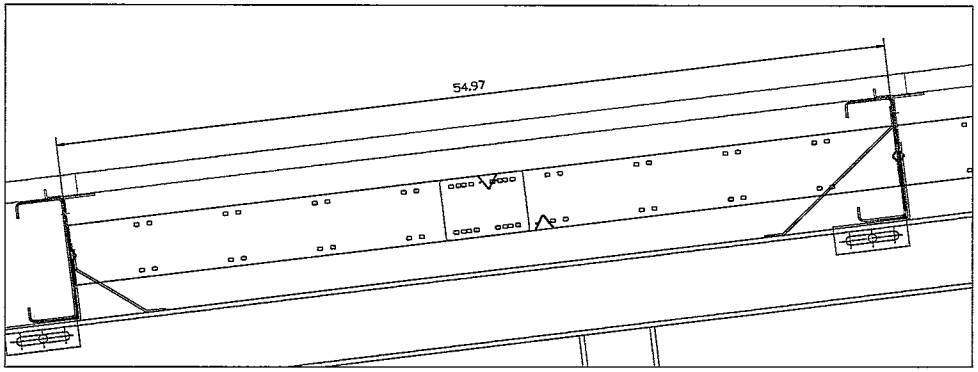
Phone: 844-757-7225
Address: 300 Woolley Drive Marshall, MI 49068

Product: Solar Carports

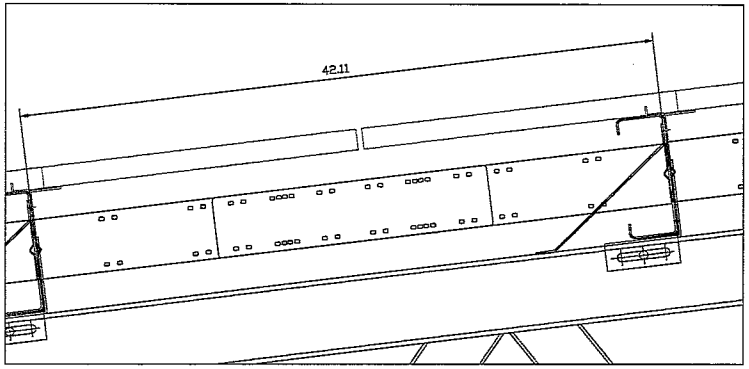
Company: Solar Mounts LLC.
Project Name / Title: 1 Commerce
Location: 1 Commerce Dr. | Orleans, MA 02653

Date: 6/11/2025

Page: 4



Purlin Stiffener Detail "A"
SCALE: 3" = 1'-0"



Purlin Stiffener Detail "B"
SCALE: 3" = 1'-0"

SOLAR MOUNTS LLC

Phone:
844-757-7225
Address:
300 Woolley Drive
Marshall, MI 49068

Product:
Solar
Carports

Company: Solar Mounts LLC.
Project Name / Title: 1 Commerce
Location: 1 Commerce Dr. | Orleans, MA 02653

Date:
6/11/2025

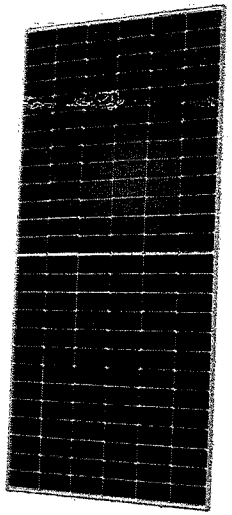
Page:
4

MATERIAL:	Solar Mounts setbacks are received from a third party and not responsible for third party surveys and electrical drawings. All CAD related files are approximations and only to be used as a reference.		SOLAR MOUNTS LLC
FINISH:		TOLERANCES:	TITLE:
WEIGHT:		ANGULAR: +/- 1° X = +/- .05 XX = +/- .025 XXX = +/- .005	SIZE: D PART NUMBER:
DO NOT SCALE DRAWING			SCALE:

Q.TRON XL-G2 SERIES

610-635 Wp | 156 Cells
22.7% Maximum Module Efficiency

MODEL Q.TRON XL-G2.3/BFG



High performance Qcells N-type solar cells

Q.ANTUM NEO Technology with optimized module layout boosts module efficiency up to 22.7%.

Bifacial energy yield gain of up to 21%

Bifacial Q.ANTUM NEO solar cells make efficient use of light shining on the module rear-side for radically improved LCOE.

A reliable investment

Double glass module design enables extended lifetime with 12-year product warranty and improved 30-year performance warranty[1].

Enduring high performance

Long-term yield security with Anti LeTID and Anti PID Technology[2]. Hot-Spot Protect.

Frame for versatile mounting options

High-tech aluminium alloy frame protects from damage, enables use of a wide range of mounting structures and is certified regarding IEC for high snow (5400 Pa) and wind loads (3750 Pa)[3].

Innovative all-weather technology

Optimal yields, whatever the weather with excellent low-light and temperature behaviour.

[1] See data sheet on rear for further information.
[2] APT test conditions according to IEC TS 62804-1:2015, method B (-1500 V, 96 h)
[3] See installation manual for instructions.

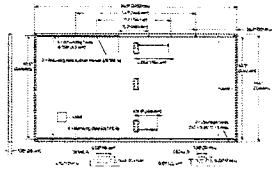
The ideal solution for:

Ground mounted solar panels

Q.TRON XL-G2 SERIES

Mechanical Specification

Format	96.9 in × 44.6 in × 1.38 in (including frame) (2462 mm × 1134 mm × 35 mm)
Weight	78.0 lbs (35.4 kg)
Front Cover	0.06 in (2.0 mm) thermally pre-stressed glass with anti-reflection technology
Back Cover	0.08 in (2.0 mm) semi-tempered glass
Frame	Anodized aluminium
Cell	6 × 26 monocrystalline Q.ANTUM NEO solar half cells
Junction box	2.09-3.98 × 1.26-2.36 × 0.59-0.71 in (53-101 mm × 32-60 mm × 15-18 mm), Protection class IP67, with bypass diodes
Cable	4 mm² Solar cable; (+) ≥ 29.5 in (750 mm), (-) ≥ 43.6 in (1350 mm)
Connector	Stäubli MC4-EVO2, Stäubli MC4; IP68



Electrical Characteristics

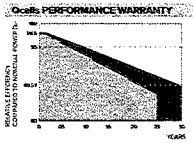
POWER CLASS			610		615		620		625		630		635	
MINIMUM PERFORMANCE AT STANDARD TEST CONDITIONS, STC¹ (POWER TOLERANCE +5W/ -0W)														
				STC		STC		STC		STC		STC		STC
Minimum	Power at MPP¹	P_{MPP} [W]	610	675.4	615	681.0	620	686.5	625	692.0	630	697.6	635	703.1
	Short Circuit Current¹	I_{SC} [A]	13.65	15.13	13.71	15.19	13.76	15.25	13.82	15.31	13.88	15.38	13.93	15.44
	Open Circuit Voltage¹	V_{OC} [V]	56.11	56.34	56.39	56.62	56.67	56.90	56.95	57.18	57.23	57.46	57.51	57.74
	Current at MPP	I_{MPP} [A]	12.95	14.34	13.00	14.40	13.05	14.46	13.10	14.51	13.15	14.57	13.21	14.62
	Voltage at MPP	V_{MPP} [V]	47.09	47.09	47.30	47.29	47.50	47.49	47.70	47.69	47.89	47.89	48.09	48.08
	Efficiency²	η [%]	≥21.8		≥22.0		≥22.2		≥22.4		≥22.6		≥22.7	

Bifaciality of P_{MPP} and I_{SC}: 80 % ± 5 % • Bifaciality given for rear side irradiation on top of STC (front side) • According to IEC 60904-1-2
¹Measurement tolerances P_{MPP} ±3 %; I_{SC}; V_{OC} ±5 % at STC: 1000 W/m²; ²at STC: 1000 W/m² • α = 135 W/m², α = 60 %, 25±2 °C, AM 1.5 according to IEC 60904-3

MINIMUM PERFORMANCE AT NORMAL OPERATING CONDITIONS, NMOT³							
Minimum	Power at MPP	P_{MPP} [W]	461.1	464.9	468.7	472.5	476.2	480.0
	Short Circuit Current	I_{SC} [A]	11.00	11.05	11.09	11.14	11.18	11.23
	Open Circuit Voltage	V_{OC} [V]	53.24	53.51	53.77	54.04	54.31	54.58
	Current at MPP	I_{MPP} [A]	10.15	10.22	10.26	10.30	10.34	10.38
	Voltage at MPP	V_{MPP} [V]	45.25	45.48	45.67	45.86	46.05	46.24

³800 W/m², NMOT, spectrum AM 1.5

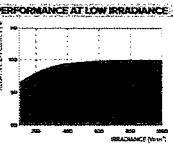
Qcells PERFORMANCE WARRANTY



At least 98.5% of nominal power during first year. Thereafter max. 0.33% degradation per year. At least 95.53% of nominal power up to 10 years. At least 85.93% of nominal power up to 30 years.

All data within measurement tolerances. Full warranties in accordance with the warranty terms of the Qcells sales organization of your respective country.

PERFORMANCE AT LOW IRRADIANCE



Typical module performance under low irradiance conditions in comparison to STC conditions (25°C, 1000 W/m²).

TEMPERATURE COEFFICIENTS						
Temperature Coefficient of I_{SC}	α	[%/K]	+0.04	Temperature Coefficient of V_{OC}	β	[%/K]	-0.24
Temperature Coefficient of P_{MPP}	γ	[%/K]	-0.30	Nominal Module Operating Temperature	NMOT	[°F]	109 ± 5.4 (43 ± 3 °C)

Properties for System Design

Maximum System Voltage	V_{SYS}	[V]	1500	PV module classification	Class II
Maximum Series Fuse Rating		[A DC]	30	Fire Rating based on ANSI/UL 61730	TYPE 29*
Max. Push Load⁴, Test/Design		[lbs/ft²]	113 (5400 Pa)/ 75 (3600 Pa)	Permitted Module Temperature on Continuous Duty	-40°F up to +185°F (-40°C up to +85°C)
Max. Pull Load⁴, Test/Design		[lbs/ft²]	78 (3750 Pa)/ 52 (2500 Pa)		

⁴ See installation Manual for instructions.

* New Type is similar to Type 3 but with metallic frame

Qualifications and Certificates

UL 61730-1 & UL 61730-2, CE-compliant.
Quality Controlled PV - TUV Rheinland.
IEC 61215:2016, IEC 61730:2016.
U.S. Patent No. 9,893,215 (solar cells).

* Contact your Qcells Sales Representative for details regarding the module's eligibility to be Buy American Act (BAA) compliant.

Qcells pursues minimizing paper output in consideration of the global environment.

Read installation instructions, must be followed. Contact our technical service for further information on approved installation of this product.
Hanwha Q CELLS America Inc. 400 Spectrum Center Drive, Suite 1401, Irvine, CA 92618, USA • TEL: +1 949 748 59 96 • EMAIL: inquiry@q-cells.com • WEB: www.q-cells.com

qcells

SOLAR MOUNTS LLC

Phone: 844-757-7225
Address: 300 Woolley Drive Marshall, MI 49068

Product: Solar Carports

Company: My Generation Energy
Project Name / Title: 1 Commerce – Carport Standard Details
Location: 1 Commerce Dr. | Orleans, MA 02653

Date: 6/11/2025

Page: **Spec - 1**

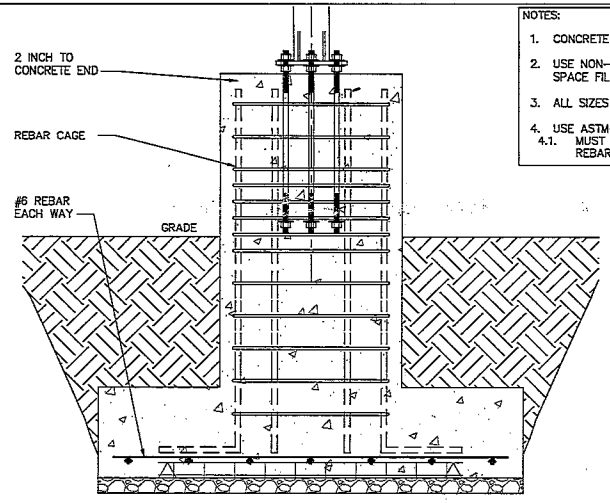
Revision:	Date:	Engineer:	Revision Description:
A	6/11/2025	AStiles	Initial Preliminary Design

MATERIAL:
FINISH:
BEVEL:
DO NOT SCALE DRAWING

Solar Mounts setbacks are received from a third party and not responsible for third party surveys and electrical drawings. All CAD related files are approximations and only to be used as a reference.

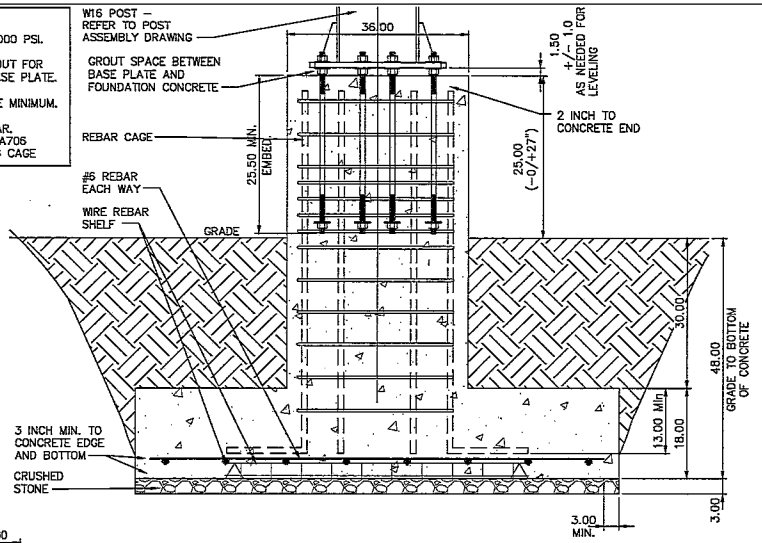
SOLAR MOUNTS LLC
TITLE: Carport – Solar Module Specifications
SIZE: D
PART NUMBER:
SCALE:

UNLESS OTHERWISE SPECIFIED:
TOLERANCES:
ANGULAR: +/- 1°
X = +/- .05
XX = +/- .025
XXX = +/- .005

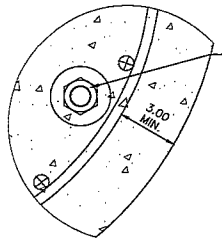


Post Foundation - Spread Footing - End View
SCALE: NOT TO SCALE

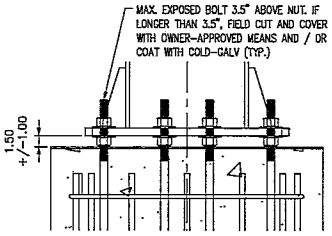
NOTES:
1. CONCRETE MINIMUM 5000 PSI.
2. USE NON-SHRINK GROUT FOR SPACE FILL BELOW BASE PLATE.
3. ALL SIZES SHOWN ARE MINIMUM.
4. USE ASTM-A615 REBAR.
   4.1. MUST USE ASTM-A706 REBAR IF WELDING CAGE



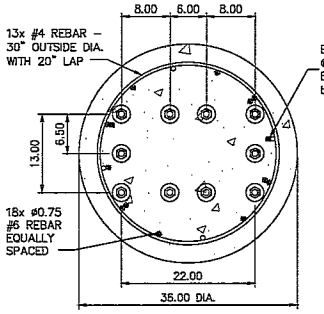
Post Foundation - Spread Footing - Side View
SCALE: NOT TO SCALE



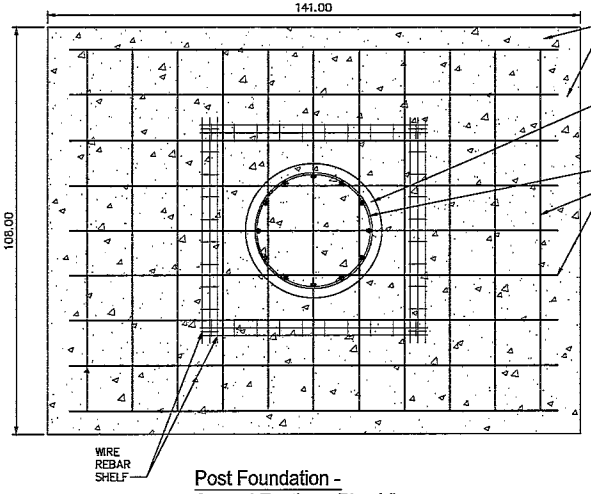
TOP PLATE BOLT PLAN DETAIL AT REBAR CAGE



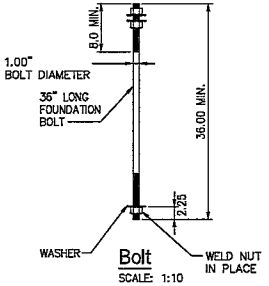
Base Plate Detail
SCALE: 1 1/2"=1'-0"



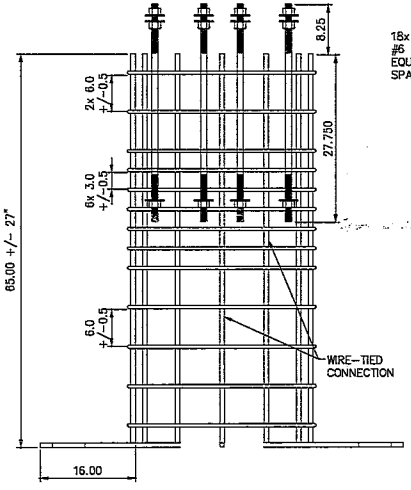
ReBar Cage with Wire-Tied Bolts
SCALE: 1:10



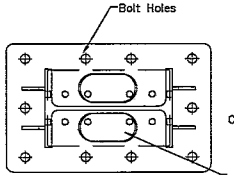
Post Foundation - Spread Footing - Plan View
SCALE: NOT TO SCALE



Bolt
SCALE: 1:10
GRADE: ASTM F1554-18 GR 105 (SEE CHART)



Spread Footing ReBar Cage with Wire-Tied Bolts
SCALE: 1:10



Post Base Plate
SCALE: 1-1/2" = 1'-0"

Foundation Selection	Spread	Array 1
Spread Ftg #6 Rebar x 8' Length (Incl. 16" Hooks) (18 per)		198
Spread Footing #4 Rebar Hoop - 30" O.D. w/20" Lap (13 per)		143
Spread Footing #6 Rebar 10'-9" Length (9 per)		99
Spread Footing #6 Rebar 8'-0" Length (11 per)		121
Spread Footing Mesh Triangle 4" x 5'-0" Length (10 per)		110

MATERIAL:
FINISH:
MACHINE:
DO NOT SCALE DRAWING

Solar Mounts setbacks are received from a third party and not responsible for third party survey and electrical drawings. All CAD related files are approximations and only to be used as a reference.

HDG Bolts and Nuts
TOLERANCES UNLESS OTHERWISE SPECIFIED:
ANGULAR: +/- 1°
X = +/- .05
XX = +/- .025
XXX = +/- .005

SOLAR MOUNTS LLC
TITLE: Carport - Foundation (Alternate)
SIZE: D
PART NUMBER:
SCALE:

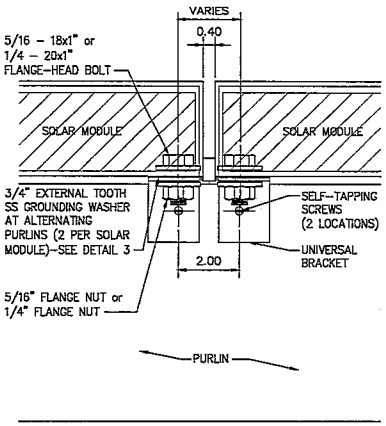
SOLAR MOUNTS LLC
Phone: 844-757-7225
Address: 300 Woolley Drive Marshall, MI 49068

Product: Solar Carports

Company: Solar Mounts LLC.
Project Name / Title: 1 Commerce
Location: 1 Commerce Dr. | Orleans, MA 02653

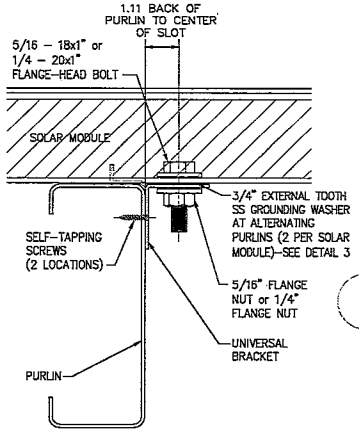
Date: 6/11/2025

Page: **Foundation-1**



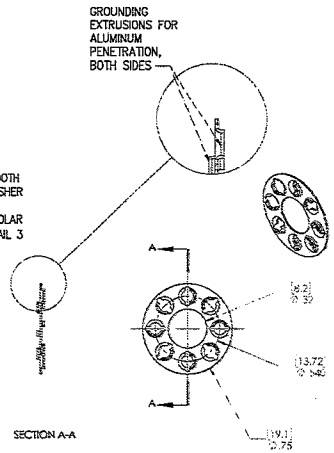
TORQUE SPEC: 12 FT–LBS

DETAIL 5 - SOLAR MODULE ATTACHMENT - PANEL BRACKET (END VIEW)



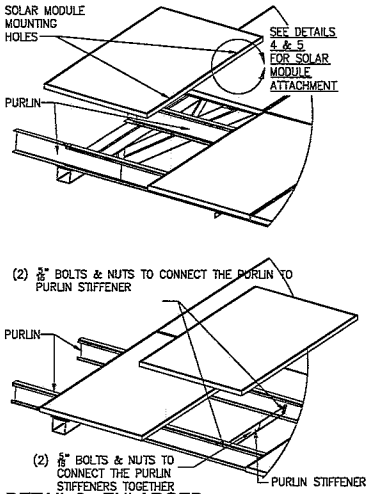
TORQUE SPEC: 12 FT–LBS

DETAIL 4 - SOLAR MODULE ATTACHMENT - PANEL BRACKET (SECTION)

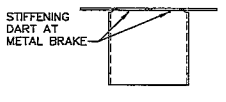


DETAIL 3

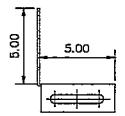
MATERIAL: 301 SS
PASSIVATE PER ASTM A967



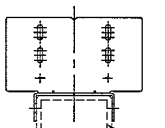
DETAIL 2 - ENLARGED DETAILS AT PURLIN ATTACHMENTS



TOP VIEW



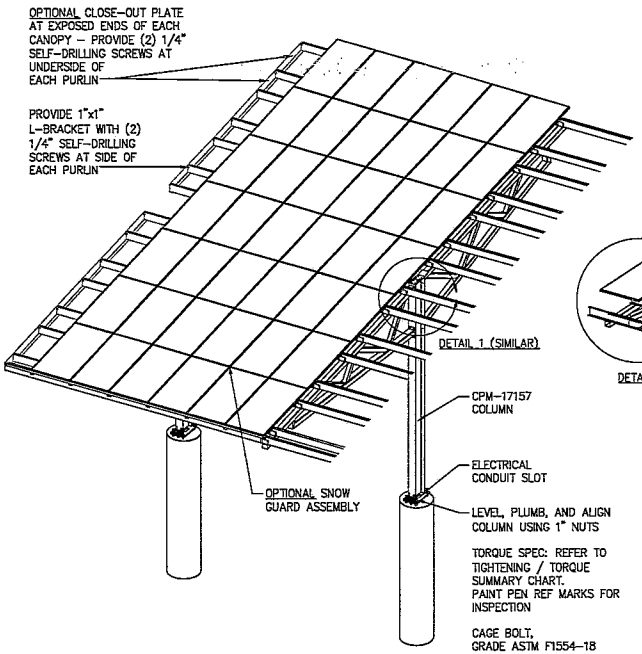
SIDE VIEW



END VIEW

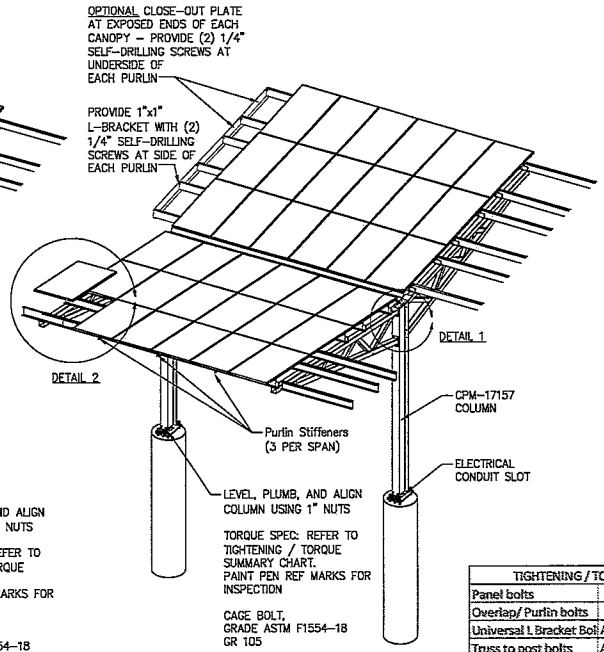
Universal Truss L-Plate

SCALE: 3" = 1'-0"



TYPICAL T-FRAME ASSEMBLY

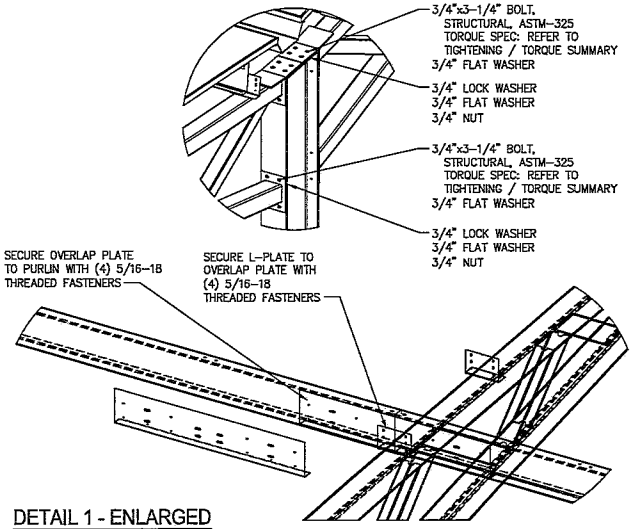
(PANEL SIZE / CONFIGURATION MAY VARY)



TYPICAL Y-FRAME ASSEMBLY

(PANEL SIZE / CONFIGURATION MAY VARY)

TIGHTENING / TORQUE SUMMARY	
Panel bolts	8-10 ft-lbs
Overlap/ Purlin bolts	12 ft-lbs
Universal L Bracket Bolt	AISC snug tight + 1/4 turn
Truss to post bolts	AISC snug tight + 1/4 turn
Purlin Stiffener to Purlin	13 ft-lbs
Foundation cage nuts	AISC snug tight + 1/4 turn



DETAIL 1 - ENLARGED DETAILS AT TRUSS ATTACHMENTS

MATERIAL:	Solar Mounts solbocks are received from a third party and not responsible for third party surveys and electrical drawings. All CAD related files are approximations and only to be used as a reference.	UNLESS OTHERWISE SPECIFIED: TOLERANCES: ANGULAR: +/- 1° X = +/- .05 XX = +/- .025 XXX = +/- .005	SOLAR MOUNTS LLC TITLE: Carport – Fastener Torque Setting Specs SIZE D PART NUMBER: SCALE:
FINISH:			
NEXT:			
DO NOT SCALE DRAWING			

SOLAR MOUNTS LLC

Phone: 844-757-7225

Address: 300 Woolley Drive Marshall, MI 49068

Product: Solar Carports

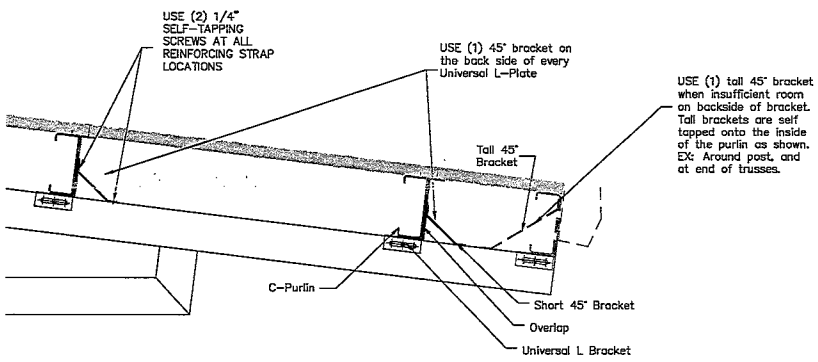
Company: Solar Mounts LLC.

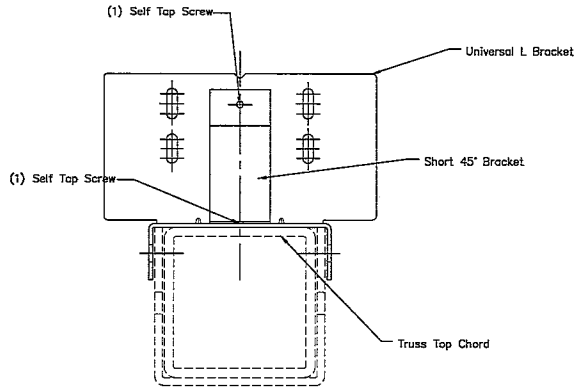
Project Name / Title: 1 Commerce

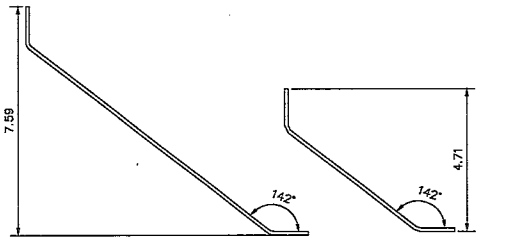
Location: 1 Commerce Dr. | Orleans, MA 02653

Date: 6/11/2025

Page: **Fasteners-1**







Tall Bracket

Short Bracket

45° Purlin Brackets

SCALE: 6" = 1'-0"

Metal Strap: 16 ga G90 Steel (Galv.)

GUTTERS ARE OPTIONAL ACCESSORIES.

NOTES:

1. MUST BE FREE OF SHARP EDGES AND BURRS THAT EFFECT SAFE HANDLING OR ASSEMBLY.

MATERIAL:	Solar Mounts setbacks are received from a third party and not responsible for third party surveys and electrical drawings. All CAD related files are approximations and only to be used as a reference.	TOLERANCES: UNLESS OTHERWISE SPECIFIED: ANGULAR: +/- 1° X = +/- .05 XX = +/- .025 XXX = +/- .005	SOLAR MOUNTS LLC
FINISH:			TITLE: Carport - OPTIONAL Gutter / Reinforcing Strap
WEIGHT:			SIZE: D PART NUMBER:
DO NOT SCALE DRAWING			SCALE:

SOLAR MOUNTS LLC

Phone: 844-757-7225

Address: 300 Woolley Drive Marshall, MI 49068

Product: Solar Carports

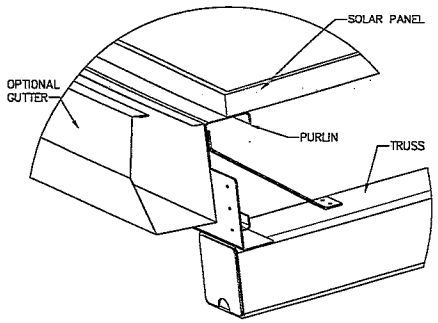
Company: Solar Mounts LLC.

Project Name / Title: 1 Commerce

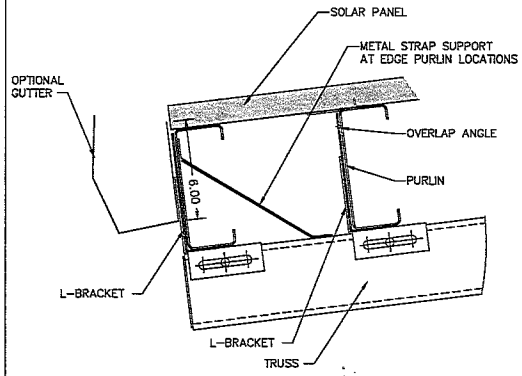
Location: 1 Commerce Dr. | Orleans, MA 02653

Date: 6/11/2025

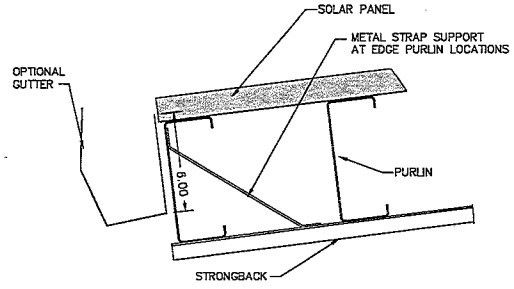
Page: **45° Purlin Bracket**



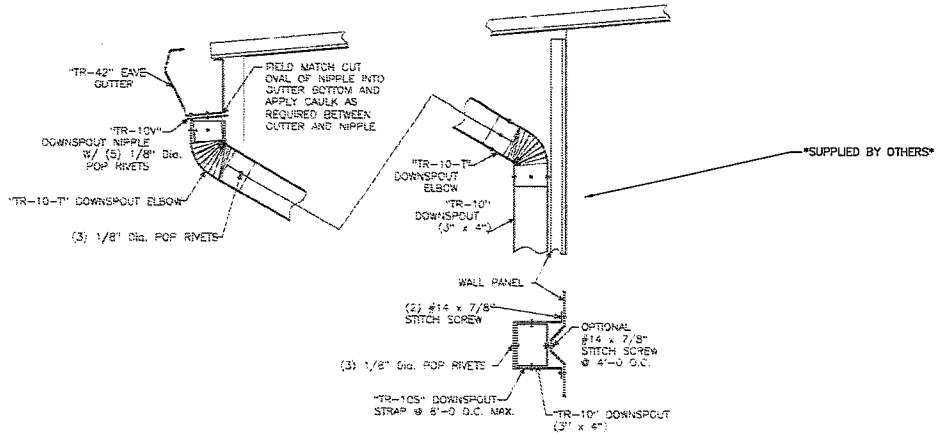
T-Frame and L-Frame
Lower Edge Gutter Isometric
SCALE: 1:10



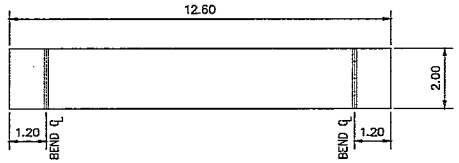
T-Frame and L-Frame
Lower Edge Gutter Detail at Truss
SCALE: 3" = 1'-0"

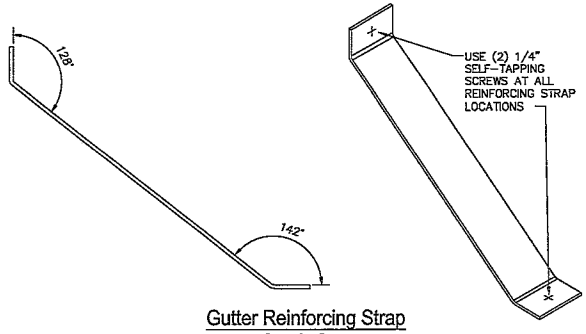


T-Frame and L-Frame
Lower Edge Gutter Detail at Strongback
SCALE: 3" = 1'-0"



Downspout with Canopy





Gutter Reinforcing Strap
SCALE: 6" = 1'-0"
Metal Strap: 16 ga G90 Steel (Galv.)

GUTTERS ARE OPTIONAL ACCESSORIES.

NOTES:
1. MUST BE FREE OF SHARP EDGES AND BURRS THAT EFFECT SAFE HANDLING OR ASSEMBLY.

MATERIAL:
FINISH:
WEIGHT:
DO NOT SCALE DRAWING

Solar Mounts setbacks are received from a third party and not responsible for third party surveys and electrical drawings. All CAD related files are approximations and only to be used as a reference.

TOLERANCES:
ANGULAR: +/- 1°
X = +/- .05
XX = +/- .025
XXX = +/- .005

SOLAR MOUNTS LLC
TITLE: Carport - OPTIONAL Gutter / Reinforcing Strap
SIZE: D
PART NUMBER:
SCALE:

SOLAR MOUNTS LLC

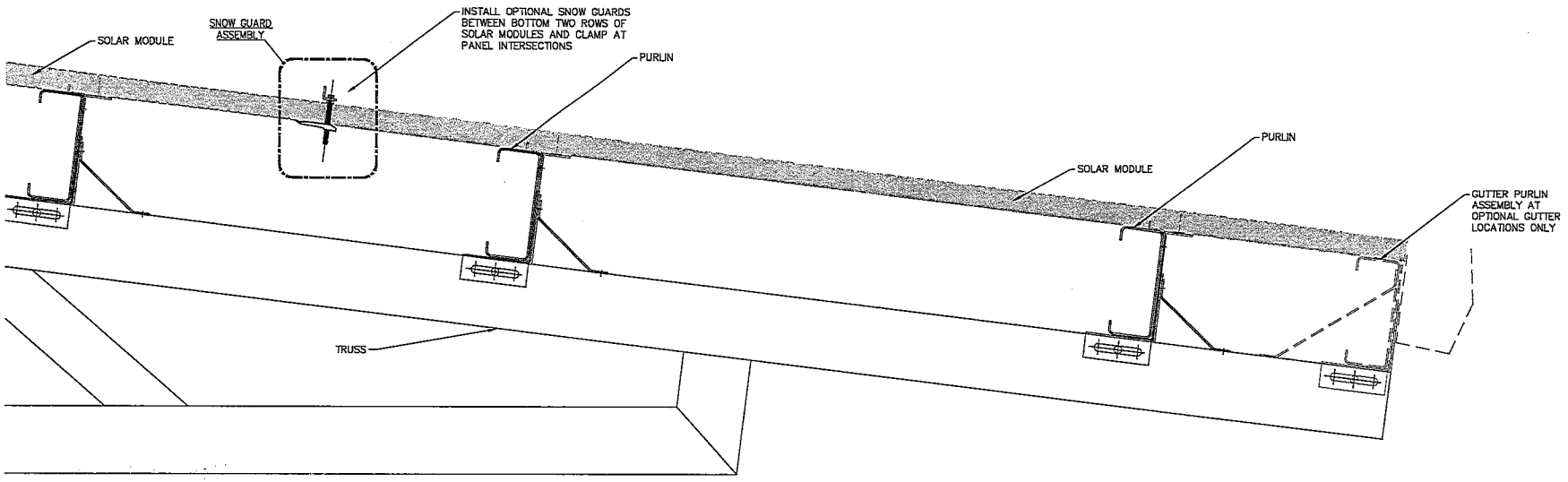
Phone: 844-757-7225
Address: 300 Woolley Drive Marshall, MI 49068

Product: Solar Carports

Company: Solar Mounts LLC.
Project Name / Title: 1 Commerce
Location: 1 Commerce Dr. | Orleans, MA 02653

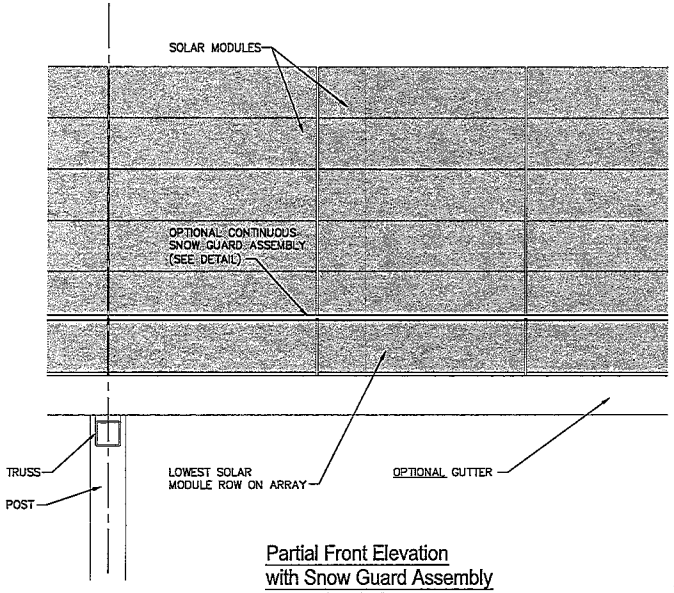
Date: 6/11/2025

Page: **Options-1**



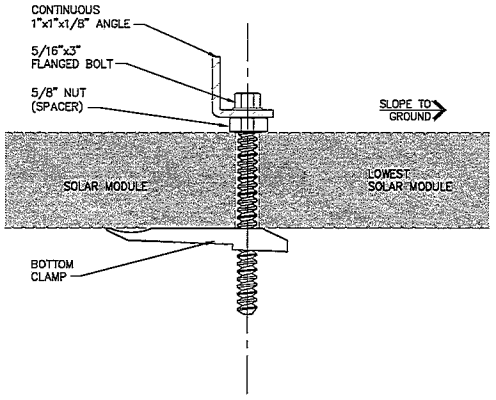
Snow Guard Detail

SCALE: 3" = 1'-0"



Partial Front Elevation with Snow Guard Assembly

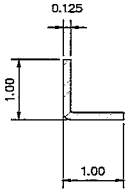
SCALE: 1" = 1'-0"



Snow Guard Assembly

SCALE: 1" = 1"

Snow Guard BOM	
Materials per 20'	Quantity
1"x1" Angle - 20' Length	1
5/16"x3" Bolt	1 per Panel in Row
5/8" Nut (Spacer)	1 per Panel in Row
Bottom Clamp	1 per Panel in Row



SNOW GUARD ANGLE

SNOW GUARDS ARE OPTIONAL ACCESSORIES FROM SOLAR MOUNTS, BUT ARE REQUIRED ON FINAL ASSEMBLIES.
NOTE: IF CUSTOMER DOES NOT ADD SNOW GUARDS TO A CARPORT, SOLAR MOUNTS LLC IS NOT LIABLE FOR DAMAGE OR INJURY TO PEOPLE, ANIMALS, AUTOMOBILES, OR PRIVATE PROPERTY RESULTING FROM LACK OF SNOW GUARDS.

NOTES:
1. MUST BE FREE OF SHARP EDGES AND BURRS THAT EFFECT SAFE HANDLING OR ASSEMBLY.

MATERIAL:
FINISH:
WEIGHT:

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TOLERANCES:
ANGULAR +/- 1°
X = +/- .05
XX = +/- .025
XXX = +/- .005

SOLAR MOUNTS LLC
TITLE: Carport - OPTIONAL Snow Guard
SIZE: D
PART NUMBER:
SCALE:

SOLAR MOUNTS LLC

Phone: 844-757-7225
Address: 300 Woolley Drive Marshall, MI 49068

Product: Solar Carports

Company: Solar Mounts LLC.
Project Name / Title: 1 Commerce
Location: 1 Commerce Dr. | Orleans, MA 02653

Date: 6/11/2025

Page: **Options-2**

GENERAL NOTES:

1. LOCATIONS AND ELEVATIONS OF UNDERGROUND PIPES AND CONDUITS HAVE BEEN DETERMINED FROM THE REFERENCED PLAN AND SHALL BE VERIFIED BY THE CONTRACTOR PRIOR TO CONSTRUCTION. H.W.MOORE ASSUMES NO RESPONSIBILITY FOR DAMAGES INCURRED AS A RESULT OF UTILITIES INACCURATELY SHOWN OR OMITTED. BEFORE PLANNING FUTURE CONNECTIONS, THE PROPER UTILITY DEPARTMENT SHALL BE NOTIFIED AND THE ACTUAL LOCATIONS OF SUBSURFACE STRUCTURES SHALL BE VERIFIED IN THE FIELD. CALL THE DIG-SAFE CALL CENTER, (888)344-7233, 72 HOURS (3 WORKING DAYS) PRIOR TO EXCAVATION.
2. ELEVATIONS REFER TO NAVD88 BASE. REFER TO REFERENCED SURVEY PREPARED BY HANCOCK ASSOCIATES.
3. ALL DISTURBANCES WITHIN THE CRANBERRY HIGHWAY SHALL CONFORM TO MASSDOT STANDARDS. ALL DISTURBANCES WITHIN NELL'S WAY SHALL CONFORM TO TOWN OF ORLEANS STANDARD.
4. IF EXISTING ABANDONED UTILITY LINES ARE ENCOUNTERED THEY SHALL BE CUT AND CAPPED.
5. ANY CONSTRUCTION DEWATERING SHALL EMPLOY MEASURES TO FILTER OUT SEDIMENT PRIOR TO ITS DISCHARGE AND SHALL CONFORM WITH TOWN OF ORLEANS REQUIREMENTS. CONTRACTOR TO SUBMIT A SKETCH OF THESE TO THE ENGINEER FOR APPROVAL.
6. CONSTRUCTION ACCESS DRIVE SHALL HAVE CRUSHED STONE TO MINIMIZE MUD FROM BEING TRACKED ONTO NELL'S WAY. MUD TRACKED ONTO NELL'S WAY SHALL BE SWEPT CLEAN DAILY.
7. CONTRACTOR TO EMPLOY MEASURES TO CONTROL DUST DURING CONSTRUCTION.
8. REMOVE ALL EXISTING BITUMINOUS CONCRETE AND CEMENT CONCRETE FROM SITE.
9. RIM ELEVATIONS OF DRAINAGE AND SANITARY SEWER MANHOLES ARE APPROXIMATE. FINAL ELEVATIONS ARE TO BE SET FLUSH. ADJUST ALL OTHER RIM ELEVATIONS OF EXISTING MANHOLES, WATER GATES, GAS GATES AND OTHER UTILITIES TO FINISHED GRADE WITHIN LIMITS OF SITE WORK.
10. THE CONTRACTOR SHALL BE RESPONSIBLE FOR SEDIMENT CONTROLS. COMPOST FILTER TUBE AND CATCH BASIN SILT SACKS SHALL BE INSTALLED PER PROJECT PLANS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING THE SEDIMENT CONTROLS UNTIL THE COMPLETION OF THE PROJECT, AT WHICH TIME THE SEDIMENT CONTROLS ARE TO BE REMOVED.
11. THE CONTRACTOR SHALL GIVE SEVENTY TWO (72) HOUR NOTICE TO PERTINENT TOWN OF ORLEANS DEPARTMENTS BEFORE COMMENCING ANY WORK IN THE FIELD.
12. THE CONTRACTOR SHALL MAKE ALL ARRANGEMENTS FOR THE ALTERATION AND ADJUSTMENT OF GAS, ELECTRIC, TELEPHONE, FIRE ALARM AND OTHER PRIVATE UTILITIES BY THE RESPECTIVE UTILITY COMPANIES, AS REQUIRED.
13. ALL DRAIN PIPES SHALL BE SOLID PVC OR HDPE UNLESS NOTED OTHERWISE.
14. IF ANY CHANGES FROM THE FINAL APPROVED DESIGN PLANS ARE REQUIRED DUE TO UNFORESEEN SITE CONDITIONS, THE CONTRACTOR OF RECORD SHALL CONTACT THE DESIGN ENGINEER OF RECORD AND SUBMIT REVISED DESIGN AND STAMPED FULL SCALE PLANS FOR REVIEW AND APPROVAL PRIOR TO CONTINUING WITH CONSTRUCTION.
15. ALL TRENCH EXCAVATION SHALL COMPLY WITH MASSACHUSETTS GENERAL LAW CHAPTER 82A, TRENCH EXCAVATION SAFETY REQUIREMENTS, AND OSHA STANDARDS TO PROTECT THE GENERAL PUBLIC FROM UNAUTHORIZED ACCESS TO UNATTENDED TRENCHES OR EXCAVATIONS. TRENCH EXCAVATION PERMIT IS REQUIRED PRIOR TO ANY CONSTRUCTION. THIS APPLIES TO ALL TRENCHES ON PUBLIC AND PRIVATE PROPERTY.
16. THE CONTRACTOR OF RECORD IS RESPONSIBLE FOR CONTACTING THE APPROPRIATE TOWN OF ORLEANS DEPARTMENT AND SCHEDULING AN APPOINTMENT 48-HOURS PRIOR TO THE DATE WHEN THE UTILITIES WILL BE MADE AVAILABLE FOR AN INSPECTION OF WATER SERVICES, SEWER SERVICES, TITLE V SEWAGE DISPOSAL SYSTEM, AND DRAINAGE SYSTEM INSTALLATIONS. THE UTILITY IN QUESTION SHALL BE FULLY EXPOSED FOR INSPECTION AND UNTIL THE INSPECTOR HAS GIVEN THEIR APPROVAL.
17. THE OWNERSHIP, OPERATION, AND MAINTENANCE OF THE PROPOSED DRAINAGE SYSTEM AND ALL APPURTENANCES ARE THE SOLE RESPONSIBILITY OF THE PROPERTY OWNER.
18. THE ORLEANS WATER DEPARTMENT HAS AGREED TO CONSIDER SUPPLYING 12" DIAMETER WATER PIPE AND FITTINGS FOR RELOCATION OF THEIR WATER MAIN BETWEEN CRANBERRY HIGHWAY AND NELLS WAY. OWNER & CONTRACTOR TO COORDINATE WITH THE ORLEANS WATER DEPARTMENT.
19. ALL WATER SYSTEM INSTALLATION WORK MUST BE PERFORMED BY A CONTRACTOR PREAPPROVED FOR SUCH WORK BY THE ORLEANS WATER DEPARTMENT.
20. BACKFLOW PREVENTER DESIGN/SPECIFICATIONS TO BE PROVIDED BY THE PLUMBING ENGINEER WITH THE BUILDING PERMIT SUBMISSION.

PERMIT SITE PLAN

FOR

17 NELLS WAY

ORLEANS, MA

RESIDENTIAL DEVELOPMENT

LOCUS MAP
SCALE: 1" = 500'

SHEET INDEX

APPLICANT

ORLEANS PLAZA, LLC
103 TERRACE STREET
ROXBURY CROSSING, MA 02120

CIVIL ENGINEER

H.W.MOORE ASSOCIATES
A DIVISION OF HANCOCK
SURVEY ASSOCIATES
121 EAST BERKELEY STREET
BOSTON, MA 02118

OWNER

ORLEANS PLAZA, LLC
103 TERRACE STREET
ROXBURY CROSSING, MA 02120

SURVEYOR

HANCOCK ASSOCIATES
315 ELM STREET,
MARLBOROUGH, MA 01752

LEGEND

	EDGE OF PAVEMENT	DMH	DRAIN MANHOLE
CCB	CAPE COD BERM	DW	DRYWELL
	CEMENT CONCRETE	AD	AREA DRAIN
T	TRANSFORMER PAD	HYD.	FIRE HYDRANT
	CROSS WALK	CB	CATCH BASIN
	PARKING STALL w/WHEEL STOP	WQCB	WATER QUALITY CATCH BASIN
	PAINTED ISLAND		OIL & GREASE SEPARATOR
49	CONTOUR WITH ELEV. 49		TEE GATE VALVE & BOX
67.8	SPOT GRADE		WATER REDUCER
	SEWER MANHOLE		WATER STOP
S	6" SEWER SERVICE	DS	DOWNSPOUT
D	12" DRAIN	CO	CLEANOUT
W	6" WATER	RD	ROOF DRAIN
F	4" FIRE SERVICE	E	UNDERGROUND ELECTRIC
CCB	CAPE COD BERM	G	GAS

PLAN REFERENCE:
1. EXISTING CONDITIONS TAKEN FROM A DIGITAL FILE NAMED "25887-ORLEANS-PLAZA-EC-WB-2022-05-27.dwg" OF A PLAN TITLED "EXISTING CONDITIONS PLAN", PLAN DATED APRIL 14, 2022. PLAN WAS PREPARED BY HANCOCK ASSOCIATES.
2. PROPOSED BUILDING FOOTPRINTS AND LAYOUT TAKEN FROM A DIGITAL FILES NAMED "230412 NELL WAY 29-UNIT SITE PLAN_APRIL 2023.dwg", "240904 OKH + ZBA PACKAGE.pdf", "D_FIRST FLOOR.dwg", "D_ROOF PLAN.dwg", "D_SECOND & THIRD FLOOR.dwg", "F_FIRST FLOOR.dwg", "F_ROOF PLAN.dwg" and "F_SECOND FLOOR.dwg", RECEIVED FROM BLOOM ARCHITECTURE ON SEPTEMBER 10, 2024. BUILDING LAYOUTS UPDATED FROM BLOOM ARCHITECTURE CAD FILE "250609 BLOOM ARCH SITE PLAN_3.dwg" RECEIVED JUNE 10, 2025.

DRAWN BY: CMK	DESIGNED BY: FAK
CHECKED BY: AD	APPROVED BY: JP

REVISIONS

4	07/31/25	SITE PLAN REVIEW COMMITTEE COMMENTS
3	07/08/25	SHEETS C-3 to C-6, SDS-1 to SDS-3
2	03/03/25	SHEETS C-5, C-8, SDS-1, SDS-2, SDS-3
1	11/15/24	REVISED SET
ISSUE	DATE	DESCRIPTION

COMMONWEALTH OF MASSACHUSETTS
JOSEPH D. PEZNOLA
CIVIL
No. 38117
REGISTERED PROFESSIONAL ENGINEER

DATE: 12-18-23

SCALE: AS NOTED

SHEET: C-1

17 NELLS WAY

ORLEANS, MASSACHUSETTS

COVER SHEET

H.W. Moore
ASSOCIATES
CIVIL ENGINEERING | LAND PLANNING
A DIVISION OF HANCOCK SURVEY ASSOCIATES
121 E. Berkeley Street, 4th Floor, Boston, MA 02118
tel: 617-357-8145 fax: 617-357-9496 web: hwmoore.com

EROSION & SEDIMENT CONTROL NOTES

1. ALL SEDIMENT AND EROSION CONTROL MEASURES SHALL BE DONE AS SET FORTH IN THE MOST CURRENT STATE SEDIMENT AND EROSION CONTROL MANUAL.
2. THOSE AREAS UNDERGOING ACTUAL CONSTRUCTION WILL BE LEFT IN AN UNTREATED OR UNVEGETATED CONDITION FOR A MINIMUM TIME. AREAS SHALL BE PERMANENTLY STABILIZED WITHIN 15 DAYS OF FINAL GRADING AND TEMPORARILY STABILIZED WITHIN 30 DAYS OF INITIAL DISTURBANCE OF THE SOIL. IF THE DISTURBANCE IS WITHIN 100 FEET OF A STREAM OR POND, THE AREA SHALL BE STABILIZED WITHIN 7 DAYS OR PRIOR TO ANY STORM EVENT (THIS WOULD INCLUDE WETLANDS).
3. SEDIMENT BARRIERS (SILT FENCE, STRAW BARRIERS, ETC.) SHOULD BE INSTALLED PRIOR TO ANY SOIL DISTURBANCE OF THE CONTRIBUTING DRAINAGE AREA ABOVE THEM. MULCH NETTING SHALL BE USED TO ANCHOR MULCH IN ALL AREAS WITH SLOPES GREATER THAN 15% AFTER OCTOBER 1ST THE SAME APPLIES FOR ALL SLOPES GREATER THAN 8%.
4. INSTALL SILTATION BARRIER AT TOE OF SLOPE TO FILTER SILT FROM RUNOFF. SEE SILTATION BARRIER DETAILS FOR PROPER INSTALLATION. SILTATION BARRIER WILL REMAIN IN PLACE PER NOTE #5.
5. ALL EROSION CONTROL STRUCTURES WILL BE INSPECTED, REPLACED AND/OR REPAIRED EVERY 7 DAYS AND IMMEDIATELY FOLLOWING ANY SIGNIFICANT RAINFALL OR SNOW MELT OR WHEN NO LONGER SERVICEABLE DUE TO SEDIMENT ACCUMULATION OR DECOMPOSITION. SEDIMENT DEPOSITS SHOULD BE REMOVED AFTER EACH STORM EVENT. THEY MUST BE REMOVED WHEN DEPOSITS REACH APPROXIMATELY ONE HALF THE HEIGHT OF THE BARRIER. SEDIMENT CONTROL DEVICES SHALL REMAIN IN PLACE AND BE MAINTAINED BY THE CONTRACTOR UNTIL AREAS UPSLOPE ARE STABILIZED BY TURF.
6. NO SLOPES, EITHER PERMANENT OR TEMPORARY, SHALL BE STEEPER THAN TWO TO ONE (2:1).
7. TEMPORARY SEEDING OF DISTURBED AREAS THAT HAVE NOT BEEN FINAL GRADED SHALL BE COMPLETED 45 DAYS PRIOR TO THE FIRST KILLING FROST TO PROTECT FROM SPRING RUNOFF PROBLEMS.
8. DURING THE CONSTRUCTION PHASE, INTERCEPTED SEDIMENT WILL BE RETURNED TO THE SITE AND REGRADED ONTO OPEN AREAS.

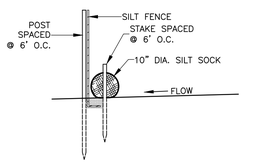
GENERAL CONSTRUCTION NOTES:

1. CONTRACTOR TO COORDINATE WITH ALL AFFECTED UTILITY COMPANIES PRIOR TO COMMENCEMENT OF WORK.
2. REMOVE ALL EXISTING SEPTIC SYSTEM STRUCTURES.
3. REMOVE ALL EXISTING DRAINAGE STRUCTURES.
4. REMOVE ALL ASPHALT AND CEMENT CONCRETE PAVEMENT, AND ALL CURBING.

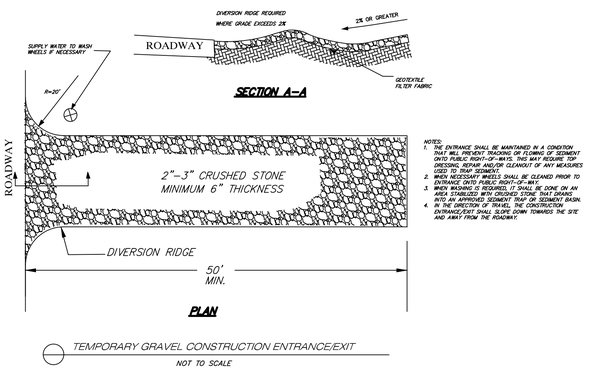
LEGEND

X — INDICATES ITEM TO BE REMOVED

SILT SOCK & SILT FENCE



SILT SOCK & SILT FENCE INSTALLATION
NOT TO SCALE



TEMPORARY GRAVEL CONSTRUCTION ENTRANCE/EXIT
NOT TO SCALE

PLAN REFERENCE:

1. EXISTING CONDITIONS TAKEN FROM A DIGITAL FILE NAMED "25887-ORLEANS-PLAZA-EC-WB-2022-05-27.dwg" OF A PLAN TITLED "EXISTING CONDITIONS PLAN", PLAN DATED APRIL 14, 2022. PLAN WAS PREPARED BY HANCOCK ASSOCIATES.
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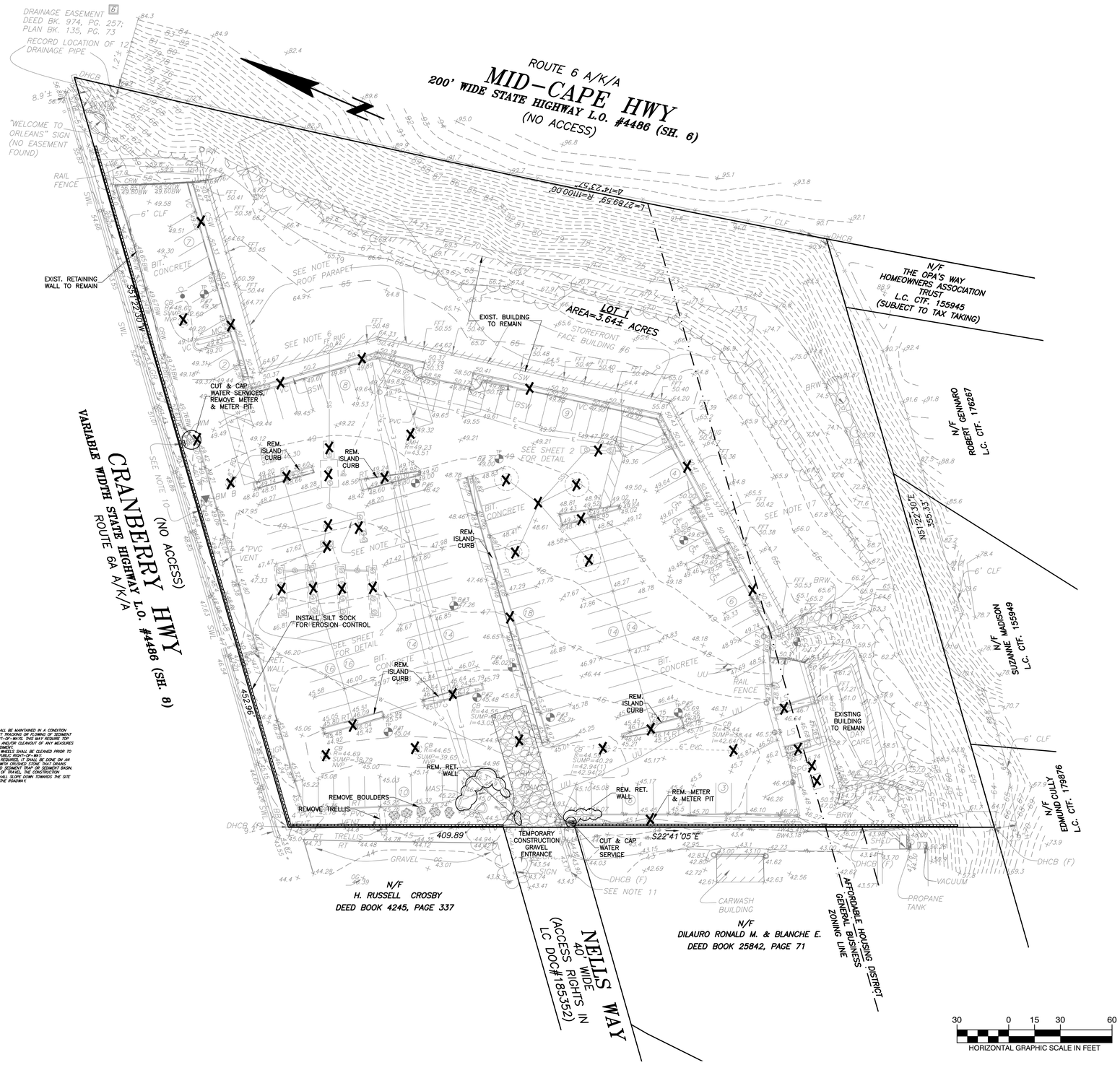

30 0 15 30 60
HORIZONTAL GRAPHIC SCALE IN FEET

DRAWN BY: CMK	DESIGNED BY: FAK
CHECKED BY: AD	APPROVED BY: JP

REVISIONS		
2	07/31/25	SITE PLAN REVIEW COMMITTEE COMMENTS
1	11/15/24	REVISED SET
ISSUE	DATE	DESCRIPTION

COMMONWEALTH OF MASSACHUSETTS — JOSEPH D. PEZNOLA — CIVIL — No. 38117 — REGISTERED PROFESSIONAL ENGINEER

DATE: 12-18-23

SCALE: 1" =30'

SHEET: C-2

17 NELLS WAY

ORLEANS, MASSACHUSETTS

SITE PREP & EROSION CONTROL PLAN

H.W. Moore ASSOCIATES
CIVIL ENGINEERING | LAND PLANNING
A DIVISION OF HANCOCK SURVEY ASSOCIATES
121 E. Berkeley Street, 4th Floor, Boston, MA 02118
tel: 617-357-8145 fax: 617-357-9495 web: hwmoore.com

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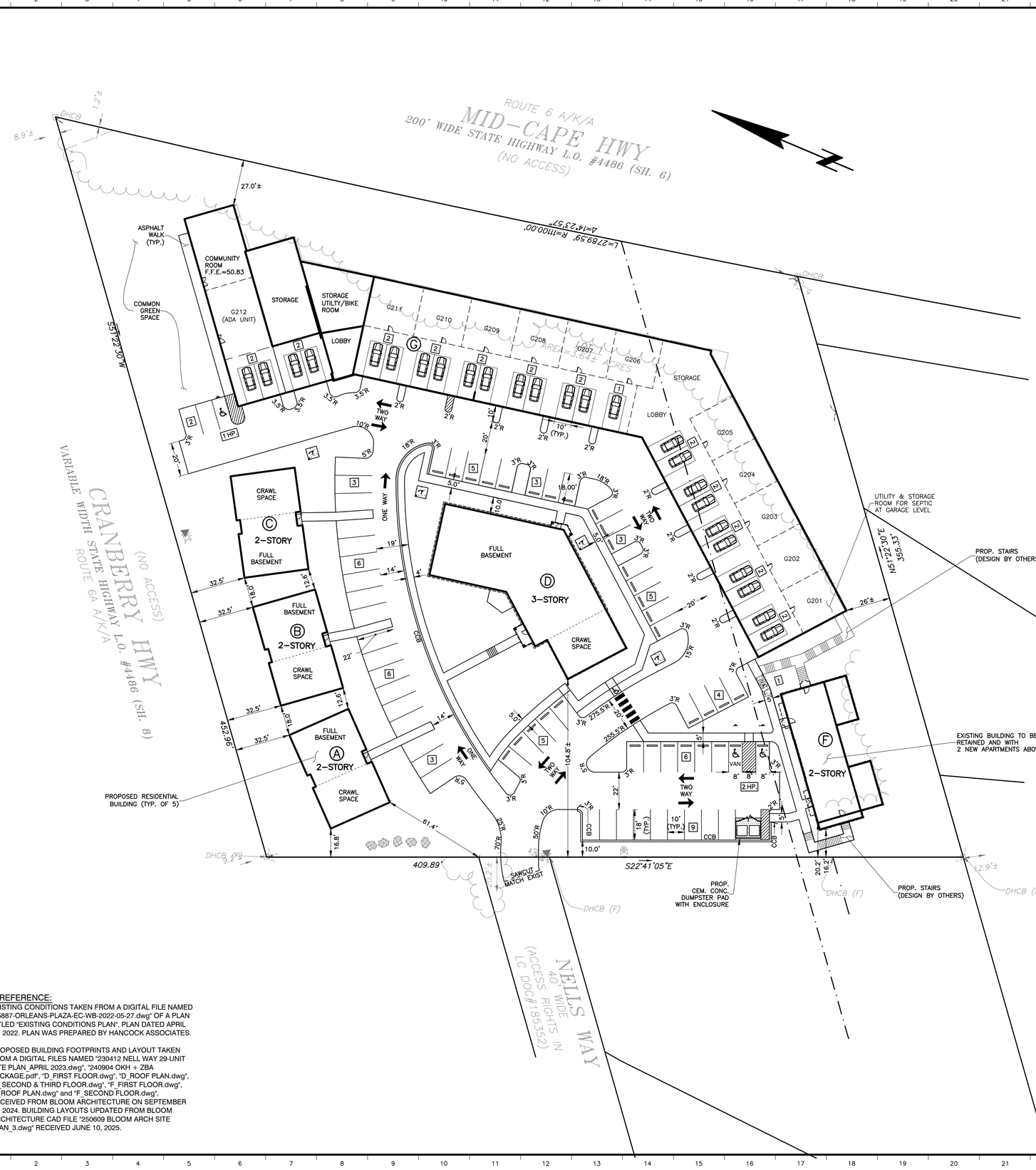
Tab: C-2 Xerox & SWPPP Plot Style: 1050C.CTB Plotted By: Chi M. Kuen
25887sp55.dwg Saved: 7/31/2025 1:08 PM Plotted: Jul 31, 2025 1:20:pm



ZONING SCHEDULE

ZONE:	GENERAL BUSINESS (GB) AFFORDABLE HOUSING DISTRICT (OVERLAY)	
ITEM	REQUIRED	PROPOSED
MIN. LOT SIZE	30,000 SQUARE FEET (S.F.)(1)	158,558± S.F.
MIN. LOT FRONTAGE	NONE	41.5 FEET: NELLS WAY
MIN. FRONT YARD	25 FEET	61.4 FEET
MIN. SIDE YARD	10 FEET	16.2 FEET
MIN. REAR YARD	10 FEET	27.0± FEET
MAX. BLDG. HEIGHT	30 FEET	29.0± FEET(5)
MAX. LOT SHAPE NUMBER	N/A	N/A
RESIDENTIAL DENSITY	8 UNITS / ACRE(2)	8 UNITS / ACRE
MAX. FLOOR AREA RATIO (FAR)	40%(3)	39.9%±(5)
MAX. IMPERVIOUS SURFACE AREA	75%(4)	46.3%±

(1): PER SECTION 164-31 B.1.a.
(2): PER SECTION 164-31 B.1.b.
(3): PER SECTION 164-34D.(3)
(4): PER SECTION 164-34D.(4)
(5): PROVIDED BY ARCHITECT

BUILDING COVERAGE

EXISTING	PROPOSED
19.4%	27.5%

NOTE: 100% OF THE 3.64± ACRE LOT IS BUILDABLE UPLANDS

COMMERCIAL BUILDING SUMMARY

BUILDING	
A	4,464± S.F. (A101/A102)
B	4,464± S.F. (B101/B102)
C	4,464± S.F. (C101/C102)
	13,392± S.F. TOTAL

RESIDENTIAL BUILDING SUMMARY

BUILDING	NO. UNITS
D	15
F	2
G	12 (FORMER MALL BLDG.)
	29 UNITS TOTAL

PARKING SUMMARY

10'x18' STALLS : 42 (OPEN AIR ASPHALT)
10'x22' STALLS : 18 (OPEN AIR ASPHALT)
8'x18' HP STALLS : 3
GARAGE STALLS : 25
TOTAL 88 SPACES

REQUIRED PER SECTION 164-34

RESIDENTIAL

29 UNITS: 29 x 1.0 = 29
29 TOTAL

COMMERCIAL

13,392 S.F. x (1 SP./250 S.F.) = 54
54 TOTAL

TOTAL REQUIRED = 83 SPACES

PARKING SPACE AREA CALCULATION

STALL: 10'W X 18'L = 180 S.F.
AISLE: 10'W x 20'L = 200 S.F.
380 S.F. PER STALL

STALL: 10'W X 22'L = 220 S.F.
AISLE: 10'W x 14'L = 140 S.F.
360 S.F. PER STALL

300 S.F. REQUIRED PER SECTION 164-34

PLAN REFERENCE:

1. EXISTING CONDITIONS TAKEN FROM A DIGITAL FILE NAMED "25887-ORLEANS-PLAZA-EC-WB-2022-05-27.dwg" OF A PLAN TITLED "EXISTING CONDITIONS PLAN", PLAN DATED APRIL 14, 2022. PLAN WAS PREPARED BY HANCOCK ASSOCIATES.

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30 0 15 30 60
HORIZONTAL GRAPHIC SCALE IN FEET

PROPOSED LEGEND

- EDGE OF PAVEMENT
- CEMENT CONCRETE
- CROSS WALK
- PARKING STALL w/WHEEL STOP
- TRUEGRID HEAVY LOAD GRASS PAVERS
- PAINTED ISLAND

DRAWN BY: CMK	DESIGNED BY: FAK
CHECKED BY: AD	APPROVED BY: JP

REVISIONS		
4	07/31/25	SITE PLAN REVIEW COMMITTEE COMMENTS
3	07/08/25	GENERAL REVISIONS
2	06/11/25	GENERAL REVISIONS
1	11/15/24	REVISED SET
ISSUE	DATE	DESCRIPTION

COMMONWEALTH OF MASSACHUSETTS
JOSEPH D. PEZNOLA
CIVIL
No. 38117
REGISTERED PROFESSIONAL ENGINEER

DATE: 12-18-23
SCALE: 1" =30'
SHEET: C-3

17 NELLS WAY

ORLEANS, MASSACHUSETTS

SITE LAYOUT & MATERIALS PLAN

H.W. Moore ASSOCIATES
CIVIL ENGINEERING | LAND PLANNING
A DIVISION OF HANCOCK SURVEY ASSOCIATES
121 E. Berkeley Street, 4th Floor, Boston, MA 02118
tel: 617-357-8145 fax: 617-357-8495 web: hwmoore.com

File Name: \\han-doscs01\CAD-2\Civil 3D Projects\25887 - Maple Hurst Builders - Orleans\Eng\DWG\25887sp55.dwg Saved 7/31/2025 1:06 PM Plotted: Jul 31, 2025 1:21:06pm
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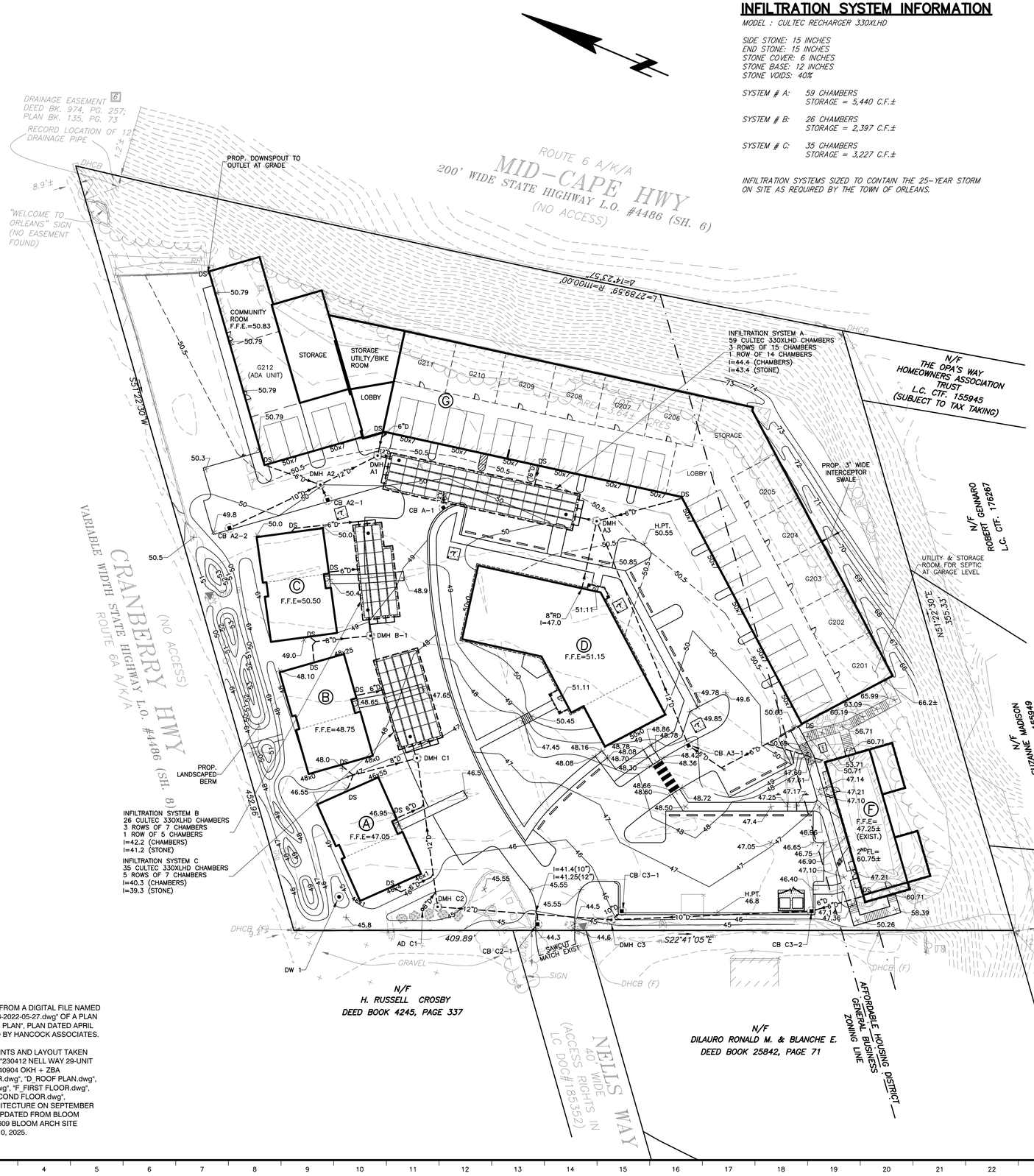
25887sp55.dwg Saved: 7/31/2025 1:06 PM Plotted: Jul 31, 2025 1:21:pm



INFILTRATION SYSTEM INFORMATION

MODEL : CULTEC RECHARGER 330XLHD

SIDE STONE: 15 INCHES
END STONE: 15 INCHES
STONE COVER: 6 INCHES
STONE BASE: 12 INCHES
STONE VOIDS: 40%

SYSTEM # A: 59 CHAMBERS
STORAGE = 5,440 C.F.±

SYSTEM # B: 26 CHAMBERS
STORAGE = 2,397 C.F.±

SYSTEM # C: 35 CHAMBERS
STORAGE = 3,227 C.F.±

INFILTRATION SYSTEMS SIZED TO CONTAIN THE 25-YEAR STORM ON SITE AS REQUIRED BY THE TOWN OF ORLEANS.

DRAINAGE SCHEDULE

STRUCTURE	RIM ELEV.	INVERT ELEV.
INFILTRATION SYSTEM A	———	44.0 (6" DS) 44.0 (12" CB A1) 44.0 (12" DMH A1 & A3) 44.0 (12" MANIFOLD)
DMH A1	50.4	46.3 (6" DS) 44.2 (12" IN) 44.1 (12" OUT)
DMH A2	50.05	46.4 (6" DS) 45.7 (10" IN) 45.5 (12" OUT)
CB A2-1	49.7	46.5 (10")
CB A2-2	49.7	46.5 (10")
CB A1	49.4	44.8 (12")
DMH A3	50.35	46.75 (6" DS) 46.6 (8" RD) 44.2 (12" IN) 44.1 (12" OUT)
CB A3-1	48.9	45.9 (6" DS) 45.4 (12")
DW 1	44.7	———
INFILTRATION SYSTEM B	———	42.2 (6" DS) 42.2 (6" MANIFOLD) 42.2 (8" MANIFOLD)
DMH B1	48.8	42.45 (8" IN) 42.35 (8" OUT)
INFILTRATION SYSTEM C	———	40.3 (6" DS) 40.3 (12" MANIFOLD)
AD C1	44.7	41.5 (8")
DMH C1	46.9	40.5 (12" IN) 40.4 (12" OUT)
DMH C2	44.8	41.0 (12" IN) 40.9 (12" OUT)
CB C2-1	44.2	41.5 (10")
DMH C3	45.5	41.65 (10" IN) 41.5 (12" OUT)
CB C3-1	46.25	41.75 (10")
CB C3-2	46.25	42.8 (6" DS) 42.5 (10")

PROPOSED LEGEND

CCB	CAPE COD BERM
49	CONTOUR WITH ELEV. 49
67.8	SPOT GRADE
TC	TOP OF CURB
BC	BOTTOM OF CURB
12"D	12" DRAIN
DMH	DRAIN MANHOLE
DW	DRYWELL
AD	AREA DRAIN
CB	CATCH BASIN
DS	DOWNSPOUT
CO	CLEANOUT
RD	ROOF DRAIN

30 0 15 30 60
HORIZONTAL GRAPHIC SCALE IN FEET

PLAN REFERENCE:

1. EXISTING CONDITIONS TAKEN FROM A DIGITAL FILE NAMED "25887-ORLEANS-PLAZA-EC-WB-2022-05-27.dwg" OF A PLAN TITLED "EXISTING CONDITIONS PLAN", PLAN DATED APRIL 14, 2022. PLAN WAS PREPARED BY HANCOCK ASSOCIATES.
2. PROPOSED BUILDING FOOTPRINTS AND LAYOUT TAKEN FROM A DIGITAL FILES NAMED "230412 NELL WAY 29-UNIT SITE PLAN_APRIL 2023.dwg", "240904 OKH + ZBA PACKAGE.pdf", "D_FIRST FLOOR.dwg", "D_ROOF PLAN.dwg", "D_SECOND & THIRD FLOOR.dwg", "F_FIRST FLOOR.dwg", "F_ROOF PLAN.dwg" and "F_SECOND FLOOR.dwg", RECEIVED FROM BLOOM ARCHITECTURE ON SEPTEMBER 10, 2024. BUILDING LAYOUTS UPDATED FROM BLOOM ARCHITECTURE CAD FILE "250609 BLOOM ARCH SITE PLAN_3.dwg" RECEIVED JUNE 10, 2025.

DRAWN BY: CMK	DESIGNED BY: FAK
CHECKED BY: AD	APPROVED BY: JP

REVISIONS		
3	07/31/25	SITE PLAN REVIEW COMMITTEE COMMENTS
2	07/08/25	GENERAL REVISIONS
1	11/15/24	REVISED SET
ISSUE	DATE	DESCRIPTION

JOSEPH D. PEZNOLA CIVIL No. 38117 REGISTERED PROFESSIONAL ENGINEER
COMMONWEALTH OF MASSACHUSETTS

DATE: 12-18-23

SCALE: 1" =30'

SHEET: C-4

17 NELLS WAY

ORLEANS, MASSACHUSETTS

SITE GRADING & DRAINAGE PLAN

H.W. Moore ASSOCIATES
CIVIL ENGINEERING | LAND PLANNING
A DIVISION OF HANCOCK SURVEY ASSOCIATES
121 E. Berkeley Street, 4th Floor, Boston, MA 02118
tel: 617-357-8145 fax: 617-357-9495 web: hwmoore.com

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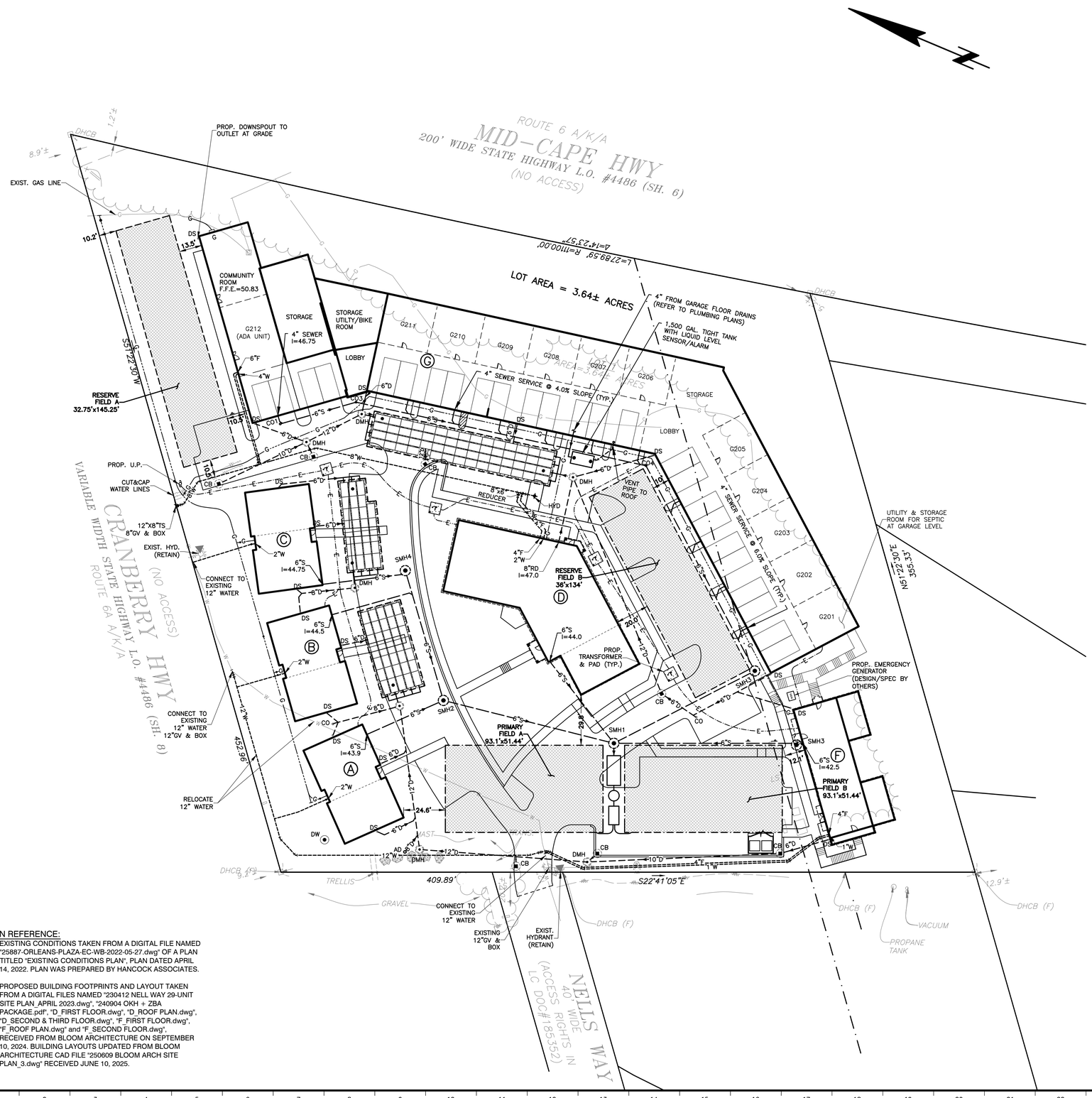

PROPOSED LEGEND

○	SEWER MANHOLE
—6"S—	6" SEWER SERVICE
—12"D—	12" DRAIN
-----6"W-----	6" WATER
-----4"F-----	4" FIRE SERVICE
DMH	DRAIN MANHOLE
DW	DRYWELL
AD	AREA DRAIN
HYD.	FIRE HYDRANT
CB	CATCH BASIN
	OIL & GREASE SEPARATOR
	TEE
	TEE GATE VALVE & BOX
	WATER REDUCER
	WATER STOP
DS	DOWNSPOUT
CO	CLEANOUT
RD	ROOF DRAIN
—E—	SUBSURFACE ELEC. CONDUIT
—T/D—	SUBSURFACE TEL/DATA CONDUIT
—G—	GAS
	HANDHOLE

SEWER SCHEDULE

STRUCTURE	RIM ELEV.	INVERT ELEV.	PIPE LENGTH	PIPE SLOPE
CO1	50.55	47.60 (6")	CO1 → CO3 46 LF	S=0.012
CO3	50.8	47.03 (6")	CO3 → CO4 175 LF	S=0.012
CO4	50.65	44.93 (6")	CO4 → SMH3 134 LF	S=0.012
SMH3	47.10	43.32 (6"IN) 43.22 (6"OUT)	SMH3 → SMH1 86 LF	S=0.02
SMH2	46.6	43.10 (6"IN) 43.00 (6"OUT)	SMH2 → SMH1 100 LF	S=0.015
SMH4	48.25	44.70 (6"IN) 44.60 (6"OUT)	SMH4 → SMH2 74 LF	S=0.02
SMH1	48.1	41.50 (6"IN) 41.40 (6"OUT)	SMH1 → ANOXIC TANK 7 LF	S=0.011
OIL/GREASE TIGHT TANK	50.55	46.20 (4"IN)	4" FROM GARAGE FLOOR DRAINS LENGTH TBD	S=0.010 (MIN.)

NOTE:
6" SEWER SERVICE PIPES FOR BUILDINGS A→D AND F TO HAVE A MINIMUM SLOPE OF 1%.

NOTES:

1. PROPOSED WATER METERS FOR EACH UNIT TO BE LOCATED IN BUILDINGS SUBJECT TO COORDINATION WITH THE ORLEANS WATER DEPARTMENT.
2. THE ORLEANS WATER DEPARTMENT HAS AGREED TO CONSIDER SUPPLYING 12" DIAMETER WATER PIPE AND FITTINGS FOR RELOCATION OF THEIR WATER MAIN BETWEEN CRANBERRY HIGHWAY AND NELLS WAY. OWNER & CONTRACTOR TO COORDINATE WITH THE ORLEANS WATER DEPARTMENT.
3. ALL WATER SYSTEM INSTALLATION WORK MUST BE PERFORMED BY A CONTRACTOR PREAPPROVED FOR SUCH WORK BY THE ORLEANS WATER DEPARTMENT.
4. BACKFLOW PREVENTER DESIGN/SPECIFICATIONS TO BE PROVIDED BY THE PLUMBING ENGINEER WITH THE BUILDING PERMIT SUBMISSION.
5. PROP. ELECTRIC & TEL/DATA UTILITIES TO BE COORDINATED WITH UTILITY COMPANIES.
6. 1" & 2" WATER SERVICES SHALL BE 200 PSI CTS POLYETHYLENE PIPE CONFORMING TO TOWN OF ORLEANS WATER DEPARTMENT STANDARDS.
7. 4", 6" AND 8" WATER PIPE SHALL BE DUCTILE IRON CEMENT LINED PIPE CONFORMING TO TOWN OF ORLEANS STANDARDS.
8. REFER TO SHEETS SDS-1 THROUGH SDS-3 FOR DESIGN AND DETAILS OF SEPTIC SYSTEM.
9. ADDITIONAL DETAILS FOR AMPHIDROME CONTROLS, INTERIOR TREATMENT, AND EQUIPMENT TO BE COORDINATED BETWEEN OWNER AND CONTRACTOR (RF MAHONEY, SUPPLIER OF SYSTEM).
10. SYSTEM OWNER TO NAME A LICENSED OPERATOR OF THE AMPHIDROME SYSTEM PRIOR TO INSTALLATION.
11. SITE SHALL BE EQUIPPED WITH A PERMANENT EMERGENCY GENERATOR CONNECTED TO ALL SEPTIC SYSTEM EQUIPMENT.

PLAN REFERENCE:

1. EXISTING CONDITIONS TAKEN FROM A DIGITAL FILE NAMED "25887-ORLEANS-PLAZA-EC-WB-2022-05-27.dwg" OF A PLAN TITLED "EXISTING CONDITIONS PLAN", PLAN DATED APRIL 14, 2022. PLAN WAS PREPARED BY HANCOCK ASSOCIATES.
2. PROPOSED BUILDING FOOTPRINTS AND LAYOUT TAKEN FROM A DIGITAL FILES NAMED "230412 NELL WAY 29-UNIT SITE PLAN_APRIL 2023.dwg", "240904 OKH + ZBA PACKAGE.pdf", "D_FIRST FLOOR.dwg", "D_ROOF PLAN.dwg", "D_SECOND & THIRD FLOOR.dwg", "F_FIRST FLOOR.dwg", "F_ROOF PLAN.dwg" and "F_SECOND FLOOR.dwg", RECEIVED FROM BLOOM ARCHITECTURE ON SEPTEMBER 10, 2024. BUILDING LAYOUTS UPDATED FROM BLOOM ARCHITECTURE CAD FILE "250609 BLOOM ARCH SITE PLAN_3.dwg" RECEIVED JUNE 10, 2025.

30 0 15 30 60
HORIZONTAL GRAPHIC SCALE IN FEET

DRAWN BY: CMK	DESIGNED BY: FAK
CHECKED BY: AD	APPROVED BY: JP

REVISIONS

ISSUE	DATE	DESCRIPTION
4	07/31/25	SITE PLAN REVIEW COMMITTEE COMMENTS
3	07/08/25	GENERAL REVISIONS
2	03/03/25	WATER SUPPLY LAYOUT, BOH COMMENTS
1	11/15/24	REVISED SET

COMMONWEALTH OF MASSACHUSETTS
JOSEPH D. PEZNOLA
CIVIL
No. 38117
REGISTERED PROFESSIONAL ENGINEER

DATE: 12-18-23

SCALE: 1" =30'

SHEET: C-5

17 NELLS WAY

ORLEANS, MASSACHUSETTS

SITE UTILITY PLAN

H.W. Moore ASSOCIATES
CIVIL ENGINEERING | LAND PLANNING
A DIVISION OF HANCOCK SURVEY ASSOCIATES
121 E. Berkeley Street, 4th Floor, Boston, MA 02118
tel: 617-357-8145 fax: 617-357-9495 web: hwmoore.com

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Tab: C-5 Site Utility Plot Style: HSOC.CTB Plotted By: Chi M. Kwan
25887sp55.dwg Saved: 7/31/2025 1:08 PM Plotted: Jul 31, 2025 2:52:pm

EXISTING PERVIOUS & IMPERVIOUS AREAS

PROPOSED PERVIOUS & IMPERVIOUS AREAS

PLAN REFERENCE:

1. EXISTING CONDITIONS TAKEN FROM A DIGITAL FILE NAMED "25887-ORLEANS-PLAZA-EC-WB-2022-05-27.dwg" OF A PLAN TITLED "EXISTING CONDITIONS PLAN", PLAN DATED APRIL 14, 2022. PLAN WAS PREPARED BY HANCOCK ASSOCIATES.
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NOTE: EXISTING BUILDINGS HAVE GREEN ROOFS.

IMPERVIOUS AREA SUMMARY

	IMPERVIOUS	PERVIOUS
EXISTING CONDITIONS	81,935 S.F. (1.881 ACRES) ±	76,701 S.F. (1.760 ACRES) ±
PROPOSED CONDITIONS	73,436 S.F. (1.685 ACRES) ±	85,200 S.F. (1.956 ACRES) ±
TOTAL DECREASE IN IMPERVIOUS SURFACE AREA	8,499 S.F. (0.20 ACRE)±	

LEGEND

- PERVIOUS AREA (LIGHT GREEN)
- PERVIOUS AREA – GREEN ROOF (ORANGE)
- IMPERVIOUS AREA – ROOF (LIGHT BLUE)
- OTHER IMPERVIOUS AREAS (UNSHADED)

40 0 20 40 80
HORIZONTAL GRAPHIC SCALE IN FEET

DRAWN BY: CMK	DESIGNED BY: FAK
CHECKED BY: AD	APPROVED BY: JP

REVISIONS

ISSUE	DATE	DESCRIPTION
3	07/31/25	SITE PLAN REVIEW COMMITTEE COMMENTS
2	07/08/25	GENERAL REVISIONS
1	11/15/24	REVISED SET

COMMONWEALTH OF MASSACHUSETTS
JOSEPH D. PEZNOLA
CIVIL
No. 38117
REGISTERED PROFESSIONAL ENGINEER

DATE: 12-18-23
SCALE: 1" = 40'
SHEET: C-6

17 NELLS WAY
ORLEANS, MASSACHUSETTS

IMPERVIOUS SURFACE AREA COMPARISON

H.W. Moore ASSOCIATES
CIVIL ENGINEERING | LAND PLANNING
A DIVISION OF HANCOCK SURVEY ASSOCIATES
121 E. Berkeley Street, 4th Floor, Boston, MA 02118
tel: 617-357-8145 fax: 617-357-9495 web: hwmoore.com

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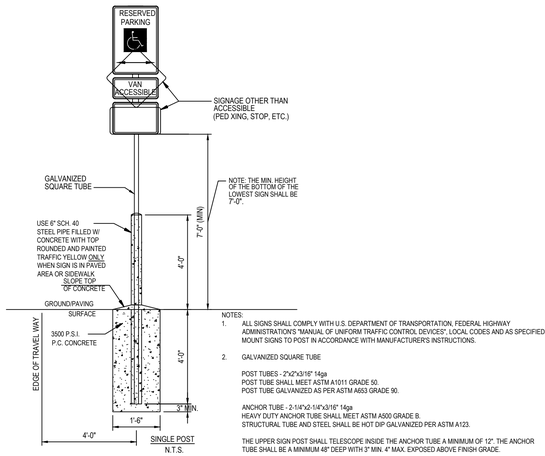


NOTES:

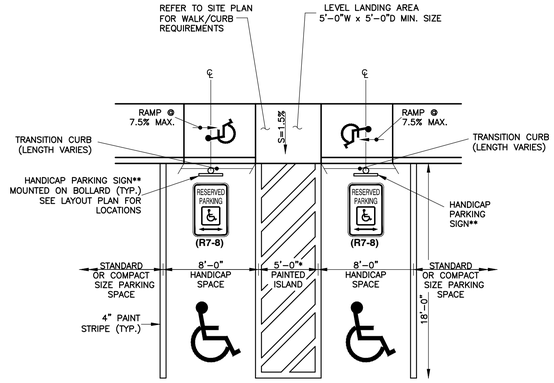
1. ALL SIGNS SHALL COMPLY WITH U.S. DEPARTMENT OF TRANSPORTATION, FEDERAL HIGHWAY ADMINISTRATION'S "MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES", LOCAL CODES AND AS SPECIFIED. MOUNT SIGNS TO POST IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.
2. GALVANIZED SQUARE TUBE

   POST TUBES - 2"x2"x3/16" 14ga
   POST TUBE SHALL MEET ASTM A1011 GRADE 50.
   POST TUBE GALVANIZED AS PER ASTM A653 GRADE 90.

   ANCHOR TUBE - 2-1/4"x2-1/4"x3/16" 14ga
   HEAVY DUTY ANCHOR TUBE SHALL MEET ASTM A500 GRADE B.
   STRUCTURAL TUBE AND STEEL SHALL BE HOT DIP GALVANIZED PER ASTM A123.

   THE UPPER SIGN POST SHALL TELESCOPE INSIDE THE ANCHOR TUBE A MINIMUM OF 12". THE ANCHOR TUBE SHALL BE A MINIMUM 48" DEEP WITH 3" MIN. 4" MAX. EXPOSED ABOVE FINISH GRADE.

SIGN MOUNTING DETAIL
(NOT TO SCALE)

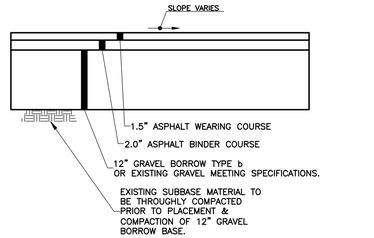


* 8'-0" ACCESS AISLE ADJACENT TO VAN SPACE
** SIGN FOR VAN SPACE TO READ "VAN ACCESSIBLE" BELOW DOUBLE ARROW AT BOTTOM.

NOTE:
R7-8 SIGNS SHALL BE MOUNTED AT A HEIGHT OF NO LESS THAN 5 FEET AND NOT MORE THAN 8 FEET TO THE TOP OF THE SIGN.

ADA REQUIREMENTS:
1. WALKS SHALL NOT EXCEED 5% SLOPE.
2. WALKS CROSS SLOPE SHALL NOT EXCEED 2%.
3. HANDICAP SPACES SHALL NOT EXCEED 2% IN ANY DIRECTION

TYPICAL HANDICAP PARKING LAYOUT PLAN
(NOT TO SCALE)



PAVEMENT NOTES

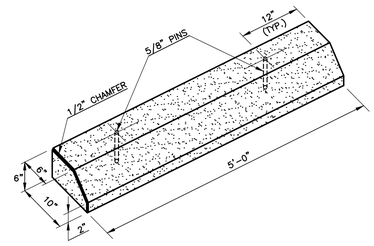
FULL DEPTH CONSTRUCTION - ON-SITE ACCESS DRIVES & PARKING AREAS.

SURFACE COURSE:	3.5" HOT MIX ASPHALT, PLACED IN TWO COURSES, 1.5" WEARING COURSE MATERIAL OVER 2.0" BINDER COURSE.
BASE COURSE:	12" COMPACTED GRAVEL BORROW TYPE b OR EXISTING GRAVEL MEETING SPECIFICATIONS.

NOTE:
FINAL 1.5" OF PAVEMENT WILL BE PLACED AT ONE TIME.

CALCIUM CHLORIDE OR WATER FOR ROADWAY DUST CONTROL.

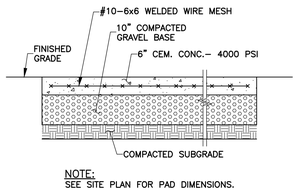
FULL DEPTH PAVEMENT SECTION ON-SITE ACCESS DRIVES AND PARKING AREAS
(NOT TO SCALE)



NOTES:

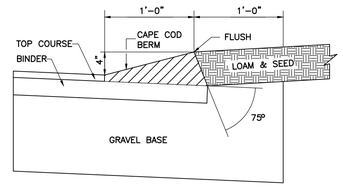
1.) WHEEL STOPS TO BE SET AT EACH PERIMETER PARKING SPACE WHERE CURBING IS NOT TO BE INSTALLED & ELSEWHERE AS SHOWN ON DRAWINGS.
2.) USE 4,000 LB. AIR ENTRAINED CONCRETE.

PRECAST CONCRETE WHEEL STOP
(NOT TO SCALE)

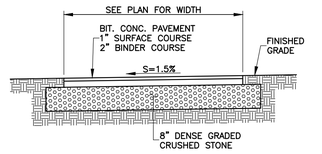


NOTE:
SEE SITE PLAN FOR PAD DIMENSIONS.

DUMPSTER PAD
(NOT TO SCALE)



CAPE COD BERM
(NOT TO SCALE)



BITUMINOUS CONCRETE WALK
(NOT TO SCALE)

DRAWN BY: CMK		DESIGNED BY: FAK
CHECKED BY: FAK		APPROVED BY: AD

REVISIONS

2	07/31/25	SITE PLAN REVIEW COMMITTEE COMMENTS
1	11/15/24	REVISED SET
ISSUE	DATE	DESCRIPTION

COMMONWEALTH OF MASSACHUSETTS
JOSEPH D. PEZNOLA
CIVIL
No. 38117
REGISTERED PROFESSIONAL ENGINEER

DATE: 12-18-23

SCALE: AS NOTED

SHEET: C-7

17 NELLS WAY

ORLEANS, MASSACHUSETTS

DETAILS

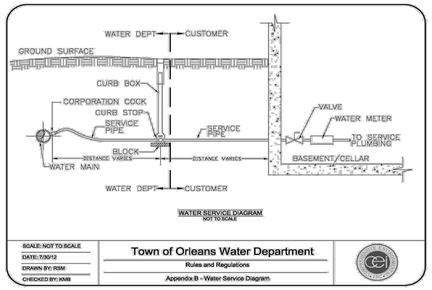
H.W. Moore ASSOCIATES
CIVIL ENGINEERING | LAND PLANNING
A DIVISION OF HANCOCK SURVEY ASSOCIATES
121 E. Berkeley Street, 4th Floor, Boston, MA 02118
tel: 617-357-8145 fax: 617-357-9495 web: hwmoore.com

File Name: \\han-bosds01\CAD-Z\Civil 3D Projects\25887 - Maple Hurst Builders - Orleans\Eng\DWG\25887sp55.dwg Saved 7/31/2025 1:08 PM Plotted: Jul 31, 2025 1:23:02pm
Xref: C-7 Details 1 Plot Style: ACAD.CTB Plotted By: Chi M. Kwan
25887sp55.dwg Saved: 7/31/2025 1:08 PM Plotted: Jul 31, 2025 1:23:pm

WATER DEPARTMENT RULES AND REGULATIONS

196 Attachment 1

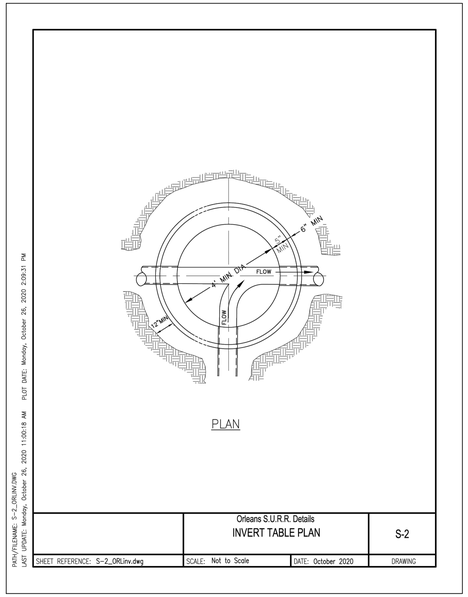
Town of Orleans
Appendix B
Water Service Diagram
[Added 8-15-2012]



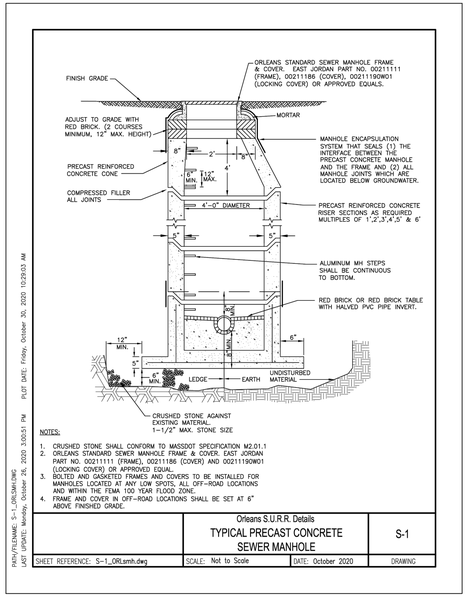
196 Attachment 1:1

04 - 01 - 2013

WATER SERVICE DIGRAM
(NOT TO SCALE)

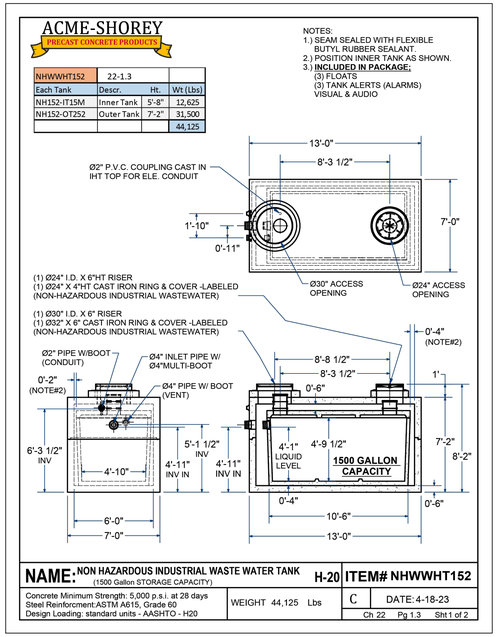


INVERT TABLE PLAN
(NOT TO SCALE)



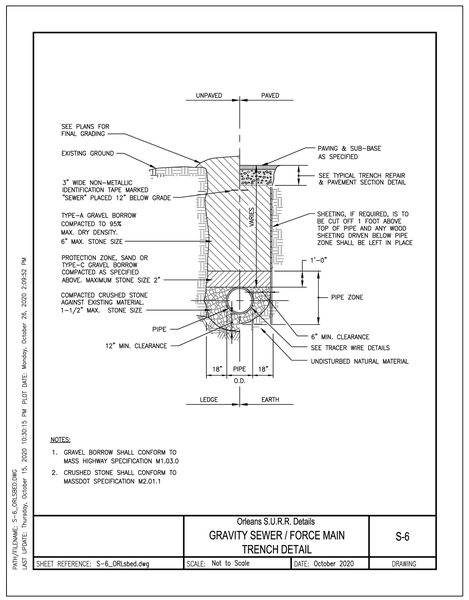
NOTE: SEWER MH1 (SMH1) TO BE 5'-0" INSIDE DIAMETER

TYPICAL PRECAST CONCRETE SEWER MANHOLE
(NOT TO SCALE)



NOTE: PROVIDE LIQUID LEVEL SENSOR WITH WARNING LIGHT.

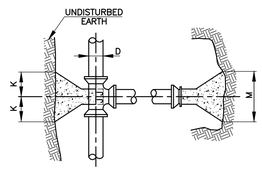
1,500 GALLON TIGHT TANK
FOR GARAGE OIL & GREASE SEPARATOR
(NOT TO SCALE)



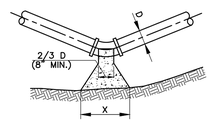
GRAVITY SEWER / FORCE MAIN TRENCH DETAIL
(NOT TO SCALE)

THRUST BLOCK SCHEDULE TABLE OF MINIMUM BEARING AREA IN SQ. IN. AGAINST UNDISTURBED SOIL FOR 4" DIA. PIPE			
SOIL BEARING CAPACITY(PSF)	90 DEGREE BEND	TEE	45 DEGREE BEND
1000	945	674	516
1500	630	450	344
2000	473	337	258
3000	315	225	172

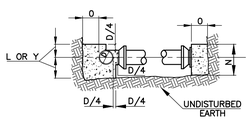
NOTE:
FOR FITTINGS W/LESS THAN 45° DEFLECTION USE BEARING AREA FOR 45° BEND BASED ON INTERNAL PRESSURE OF 80 PSI



PLAN - TEE & PLUG



PLAN - HORIZ. & VERT. BEND



TYPICAL SECTION TEES, BENDS & PLUGS

SIZE OF BRANCH	J	K	L	M	N	O
4" THRU 8"	10"	10"	1'-0"	2'-0"	1'-6"	10"
10" THRU 16"	1'-0"	1'-6"	1'-8"	3'-10"	2'-0"	1'-6"
24"	1'-4"	2'-0"	2'-6"	5'-0"	3'-6"	1'-8"

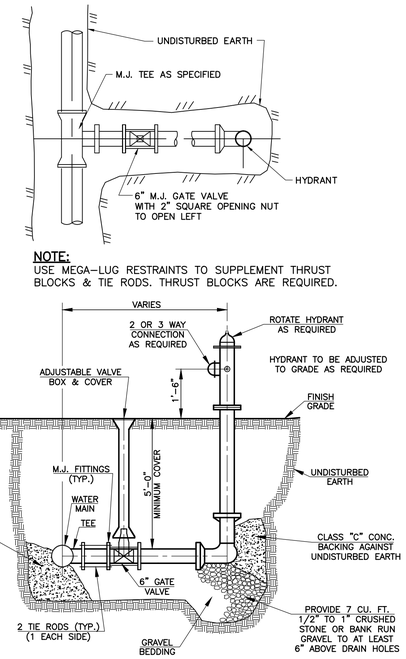
TEES & PLUGS

	90° & 45° BENDS			22-1/2 & 11-1/4		
D	4" TO 8"	10" TO 16"	24"	4" TO 8"	10" TO 16"	24"
X	1'-8"	3'-4"	5'-0"	1'-4"	2'-0"	3'-6"
Y	1'-2"	1'-8"	2'-4"	1'-0"	1'-2"	2'-4"

BENDS

CEMENT CONCRETE: 3,000 PSI AT 28 DAYS

THRUST BLOCK DETAILS
(NOT TO SCALE)



TYPICAL HYDRANT VALVE
(NOT TO SCALE)

DRAWN BY: CMK	DESIGNED BY: FAK
CHECKED BY: FAK	APPROVED BY: AD

REVISIONS		
3	07/30/25	SITE PLAN REVIEW COMMITTEE COMMENTS
2	03/03/25	BOH COMMENTS
1	11/15/24	REVISED SET
ISSUE	DATE	DESCRIPTION

COMMONWEALTH OF MASSACHUSETTS
JOSEPH D. PEZNOLA
CIVIL
No. 38117
REGISTERED PROFESSIONAL ENGINEER

DATE: 12-18-23

SCALE: AS NOTED

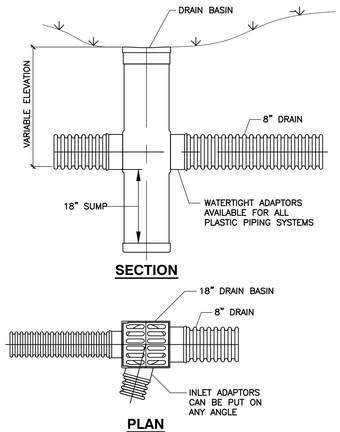
SHEET: C-8

17 NELLS WAY

ORLEANS, MASSACHUSETTS

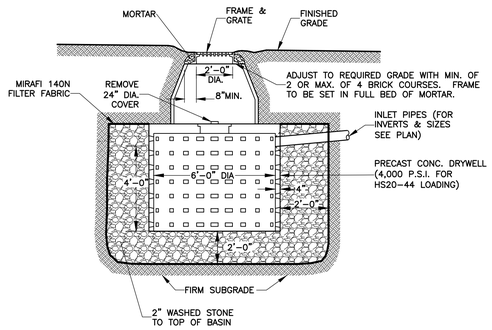
DETAILS

H.W. Moore ASSOCIATES
CIVIL ENGINEERING | LAND PLANNING
A DIVISION OF HANCOCK SURVEY ASSOCIATES
121 E. Berkeley Street, 4th Floor, Boston, MA 02118
tel: 617-357-9145 fax: 617-357-9496 web: hwmoore.com



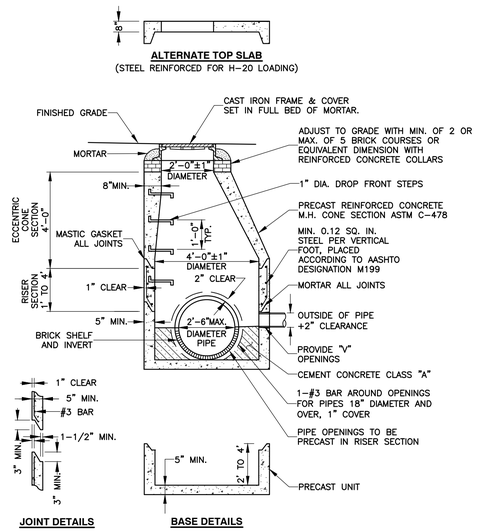
TYPICAL INSTALLATIONS
AREA DRAIN

(NOT TO SCALE)



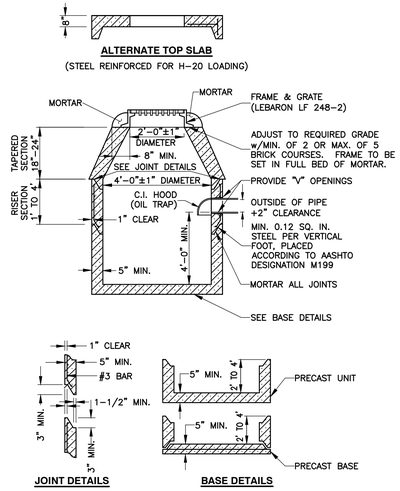
DRYWELL WITH
FRAME & GRATE

(NOT TO SCALE)



DRAIN
MANHOLE

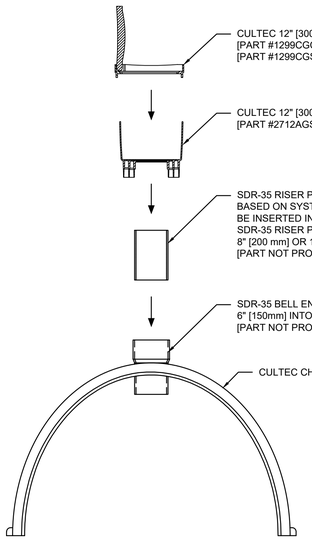
(NOT TO SCALE)



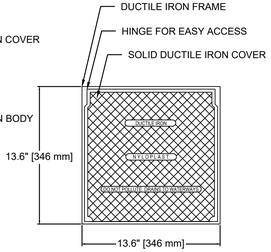
CATCH
BASIN

(NOT TO SCALE)

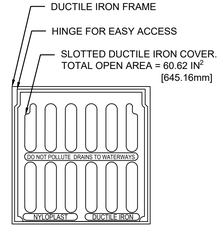
FINAL ASSEMBLY



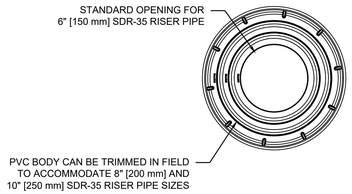
SOLID COVER OPTION



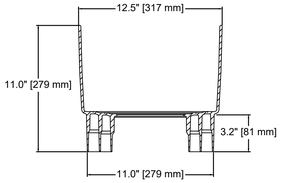
SLOTTED COVER OPTION

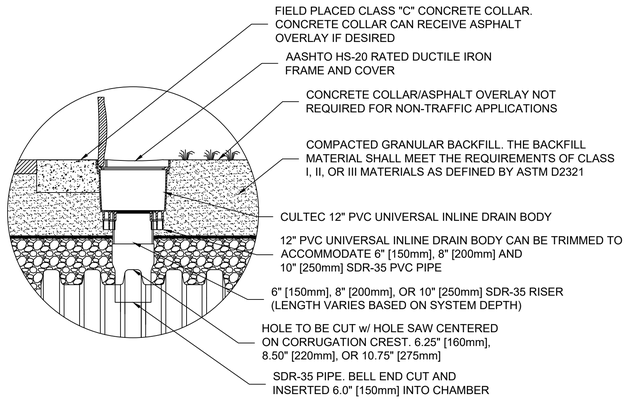


PVC BODY PLAN VIEW



PVC BODY ELEVATION VIEW





CULTEC UNIVERSAL
INSPECTION PORT KIT DETAIL

(NOT TO SCALE)

DRAWN BY: CMK	DESIGNED BY: FAK
CHECKED BY: FAK	APPROVED BY: AD

REVISIONS

ISSUE	DATE	DESCRIPTION
2	07/31/25	SITE PLAN REVIEW COMMITTEE COMMENTS
1	11/15/24	REVISED SET

COMMONWEALTH OF MASSACHUSETTS
JOSEPH D. PEZNOLA
CIVIL
No. 38117
REGISTERED PROFESSIONAL ENGINEER

DATE: 12-18-23

SCALE: AS NOTED

SHEET: C-9

17 NELLS WAY

ORLEANS, MASSACHUSETTS

DETAILS

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121 E. Berkeley Street, 4th Floor, Boston, MA 02118
tel: 617-357-8145 fax: 617-357-9495 web: hwmoore.com

File Name: \\nin-sbosfs01\CAD-2\Civil 3D Projects\25887 - Maple Hurst Builders - Orleans\Eng\DWG\25887sp55.dwg Saved 7/31/2025 1:08 PM Plotted: Jul 31, 2025 1:23:38pm
Tab: C-Details 3 Plot Style: PDSC.CTB Plotted By: Chi M. Kwan
25887sp55.dwg Saved: 7/31/2025 1:08 PM Plotted: Jul 31, 2025 1:23:pm

CULTEC RECHARGER® 330XLHD PRODUCT SPECIFICATIONS

GENERAL
CULTEC RECHARGER 330XLHD CHAMBERS ARE DESIGNED FOR UNDERGROUND STORMWATER MANAGEMENT. THE CHAMBERS MAY BE USED FOR RETENTION, RECHARGING, DETENTION OR CONTROLLING THE FLOW OF ON-SITE STORMWATER RUNOFF.

CHAMBER PARAMETERS
1. THE CHAMBERS SHALL BE MANUFACTURED BY CULTEC, OF BROOKFIELD, CT, USA. (203-775-4416 OR 1-800-428-5832)
2. THE CHAMBER SHALL BE VACUUM THERMOFORMED OF HIGH MOLECULAR WEIGHT HIGH DENSITY POLYETHYLENE (HMWHDPE) WITH A BLACK INTERIOR AND BLUE EXTERIOR.
3. THE CHAMBER SHALL BE ARCHED IN SHAPE.
4. THE CHAMBER SHALL BE OPEN-BOTTOMED.
5. THE CHAMBER SHALL BE JOINED USING AN INTERLOCKING OVERLAPPING RIB METHOD. CONNECTIONS MUST BE FULLY SHOULDERED OVERLAPPING RIBS, HAVING NO SEPARATE COUPLINGS OR SEPARATE END WALLS
6. THE NOMINAL CHAMBER DIMENSIONS OF THE CULTEC RECHARGER 330XLHD SHALL BE 30.5 INCHES (775 mm) TALL, 52 INCHES (1321 mm) WIDE AND 8.5 FEET (2.59 m) LONG. THE INSTALLED LENGTH OF A JOINED RECHARGER 330XLHD SHALL BE 7 FEET (2.13 m).
7. MAXIMUM INLET OPENING ON THE CHAMBER ENDWALL IS 24 INCHES (600 mm) HDPE.
8. THE CHAMBER SHALL HAVE TWO SIDE PORTALS TO ACCEPT CULTEC HVLV® FC-24 FEED CONNECTORS TO CREATE AN INTERNAL MANIFOLD. THE NOMINAL DIMENSIONS OF EACH SIDE PORTAL SHALL BE 10.5 INCHES (267 mm) HIGH BY 11.5 INCHES (292 mm) WIDE. MAXIMUM ALLOWABLE OUTER DIAMETER (O.D.) PIPE SIZE IN THE SIDE PORTAL IS 11.75 INCHES (298 mm).
9. THE NOMINAL CHAMBER DIMENSIONS OF THE CULTEC HVLV FC-24 FEED CONNECTOR SHALL BE 12 INCHES (305 mm) TALL, 16 INCHES (406 mm) WIDE AND 24.2 INCHES (614 mm) LONG.
10. THE NOMINAL STORAGE VOLUME OF THE RECHARGER 330XLHD CHAMBER SHALL BE 7.459 FT³ / FT (0.693 m³ / m) - WITHOUT STONE. THE NOMINAL STORAGE VOLUME OF A JOINED RECHARGER 330XLHD SHALL BE 52.213 FT³ / UNIT (1.478 m³ / UNIT) - WITHOUT STONE.
11. THE NOMINAL STORAGE VOLUME OF THE HVLV FC-24 FEED CONNECTOR SHALL BE 0.913 FT³ / FT (0.085 m³ / m) - WITHOUT STONE.
12. THE RECHARGER 330XLHD CHAMBER SHALL HAVE FIFTY-SIX DISCHARGE HOLES BORED INTO THE SIDEWALLS OF THE UNIT'S CORE TO PROMOTE LATERAL CONVEYANCE OF WATER.
13. THE RECHARGER 330XLHD CHAMBER SHALL HAVE 16 CORRUGATIONS.
14. THE ENDWALL OF THE CHAMBER, WHEN PRESENT, SHALL BE AN INTEGRAL PART OF THE CONTINUOUSLY FORMED UNIT. SEPARATE END PLATES CANNOT BE USED WITH THIS UNIT.
15. THE RECHARGER 330XLRHD STAND ALONE UNIT MUST BE FORMED AS A WHOLE CHAMBER HAVING TWO FULLY FORMED INTEGRAL ENDWALLS AND HAVING NO SEPARATE END PLATES OR SEPARATE END WALLS.
16. THE RECHARGER 330XLSHD STARTER UNIT MUST BE FORMED AS A WHOLE CHAMBER HAVING ONE FULLY FORMED INTEGRAL ENDWALL AND ONE PARTIALLY FORMED INTEGRAL ENDWALL WITH A LOWER TRANSFER OPENING OF 14 INCHES (356 mm) HIGH X 34.5 INCHES (876 mm) WIDE.
17. THE RECHARGER 330XLIHD INTERMEDIATE UNIT MUST BE FORMED AS A WHOLE CHAMBER HAVING ONE FULLY OPEN ENDWALL AND ONE PARTIALLY FORMED INTEGRAL ENDWALL WITH A LOWER TRANSFER OPENING OF 14 INCHES (356 mm) HIGH X 34.5 INCHES (876 mm) WIDE.
18. THE RECHARGER 330XLEHD END UNIT MUST BE FORMED AS A WHOLE CHAMBER HAVING ONE FULLY FORMED INTEGRAL ENDWALL AND ONE FULLY OPEN END WALL AND HAVING NO SEPARATE END PLATES OR END WALLS.
19. THE HVLV FC-24 FEED CONNECTOR MUST BE FORMED AS A WHOLE CHAMBER HAVING TWO OPEN END WALLS AND HAVING NO SEPARATE END PLATES OR SEPARATE END WALLS. THE UNIT SHALL FIT INTO THE SIDE PORTALS OF THE RECHARGER 330XLHD AND ACT AS CROSS FEED CONNECTIONS.
20. CHAMBERS MUST HAVE HORIZONTAL STIFFENING FLEX REDUCTION STEPS BETWEEN THE RIBS.
21. THE CHAMBER SHALL HAVE A 6 INCH (152 mm) DIAMETER RAISED INTEGRAL CAP AT THE TOP OF THE ARCH IN THE CENTER OF EACH UNIT TO BE USED AS AN OPTIONAL INSPECTION PORT OR CLEAN-OUT.
22. THE UNITS MAY BE TRIMMED TO CUSTOM LENGTHS BY CUTTING BACK TO ANY CORRUGATION.
23. THE CHAMBER SHALL BE MANUFACTURED IN AN ISO 9001:2015 CERTIFIED FACILITY.
24. MAXIMUM ALLOWED COVER OVER TOP OF UNIT SHALL BE 12 FEET (3.66 m)
25. THE INSTALLED CHAMBER SYSTEM SHALL BE STRUCTURALLY DESIGNED TO PROVIDE RESISTANCE TO LIVE LOADS AS DEFINED BY THE AASHTO H-20/HL-93 SPECIFICATION WHEN INSTALLED ACCORDING TO CULTEC'S RECOMMENDED INSTALLATION INSTRUCTIONS.

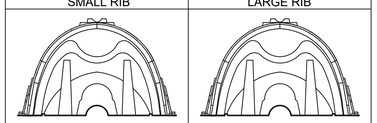
CULTEC AFAB-HPF™ WOVEN GEOTEXTILE
CULTEC AFAB-HPF WOVEN GEOTEXTILE IS DESIGNED AS A UNDERLAYMENT TO PREVENT SCOURING CAUSED BY WATER MOVEMENT WITHIN THE CULTEC CHAMBERS AND FEED CONNECTORS UTILIZING THE CULTEC MANIFOLD FEATURE. IT MAY ALSO BE USED AS A COMPONENT OF THE CULTEC SEPARATOR ROW TO ACT AS A BARRIER TO PREVENT SOIL/CONTAMINANT INTRUSION INTO THE STONE WHILE ALLOWING FOR MAINTENANCE.

GEOTEXTILE PARAMETERS
1. THE GEOTEXTILE SHALL BE PROVIDED BY CULTEC OF BROOKFIELD, CT. (203-775-4416 OR 1-800-428-5832)
2. THE GEOTEXTILE SHALL BE BLACK IN APPEARANCE.
3. THE GEOTEXTILE SHALL HAVE A TENSILE STRENGTH OF 320 X 320 LBS (1,420 X 1,420 N) PER ASTM D4632 TESTING METHOD.
4. THE GEOTEXTILE SHALL HAVE A ELONGATION @ BREAK RESISTANCE OF 15 X 15% PER ASTM D4632 TESTING METHOD.
5. THE GEOTEXTILE SHALL HAVE A WIDE WIDTH TENSILE RESISTANCE OF 3,563 X 3,563 LBS/FT (52 X 52 KN/M) PER ASTM D4595 TESTING METHOD.
6. THE GEOTEXTILE SHALL HAVE A CBR PUNCTURE RESISTANCE OF 1,500 LBS (6,670 N) PER ASTM D6241 TESTING METHOD.
7. THE GEOTEXTILE SHALL HAVE A TRAPEZOIDAL TEAR RESISTANCE OF 120 X 120 LBS (540 X 540 N) PER ASTM D4533 TESTING METHOD.
8. THE GEOTEXTILE SHALL HAVE AN APPARENT OPENING SIZE OF 30 US STD. SIEVE (0.60 MM) PER ASTM D4751 TESTING METHOD.
9. THE GEOTEXTILE SHALL HAVE A PERMITTIVITY RATING OF 0.2 SEC-1 PER ASTM D4491 TESTING METHOD.
10. THE GEOTEXTILE SHALL HAVE A WATER FLOW RATING OF 22 GPM/FT2 (900 LPM/M2) PER ASTM D4491 TESTING METHOD.
11. THE GEOTEXTILE SHALL HAVE A UV RESISTANCE OF 70% @ 500 HRS. PER ASTM D4355 TESTING METHOD.

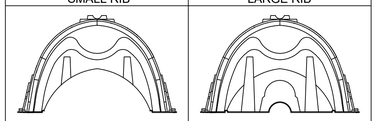
CULTEC NO. 410™ NON-WOVEN GEOTEXTILE
CULTEC NO. 410™ NON-WOVEN GEOTEXTILE MAY BE USED WITH CULTEC CONTACTOR® AND RECHARGER® STORMWATER INSTALLATIONS TO PROVIDE A BARRIER THAT PREVENTS SOIL INTRUSION INTO THE STONE.

GEOTEXTILE PARAMETERS
1. THE GEOTEXTILE SHALL BE PROVIDED BY CULTEC, OF BROOKFIELD, CT. (203-775-4416 OR 1-800-428-5832)
2. THE GEOTEXTILE SHALL BE BLACK IN APPEARANCE.
3. THE GEOTEXTILE SHALL HAVE A TYPICAL WEIGHT OF 4.5 OZ/SY (142 G/M).
4. THE GEOTEXTILE SHALL HAVE A TENSILE STRENGTH VALUE OF 120 LBS (533 N) PER ASTM D4632 TESTING METHOD.
5. THE GEOTEXTILE SHALL HAVE AN ELONGATION @ BREAK VALUE OF 50% PER ASTM D4632 TESTING METHOD.
6. THE GEOTEXTILE SHALL HAVE A MULLEN BURST VALUE OF 225 PSI (1551 KPA) PER ASTM D3786 TESTING METHOD.
7. THE GEOTEXTILE SHALL HAVE A PUNCTURE STRENGTH VALUE OF 65 LBS (289 N) PER ASTM D4833 TESTING METHOD.
8. THE GEOTEXTILE SHALL HAVE A CBR PUNCTURE VALUE OF 340 LBS (1513 N) PER ASTM D6241 TESTING METHOD.
9. THE GEOTEXTILE SHALL HAVE A TRAPEZOID TEAR VALUE OF 50 LBS (222 N) PER ASTM D4533 TESTING METHOD.
10. THE GEOTEXTILE SHALL HAVE A AOS VALUE OF 70 U.S. SIEVE (0.212 MM) PER ASTM D4751 TESTING METHOD.
11. THE GEOTEXTILE SHALL HAVE A PERMITTIVITY VALUE OF 1.7 SEC-1 PER ASTM D4491 TESTING METHOD.
12. THE GEOTEXTILE SHALL HAVE A WATER FLOW RATE VALUE OF 135 GAL/MIN/SF (5500 L/MIN/SM) PER ASTM D4491 TESTING METHOD.
13. THE GEOTEXTILE SHALL HAVE A UV STABILITY @ 500 HOURS VALUE OF 70% PER ASTM D4355 TESTING METHOD.

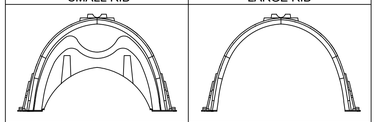
MODEL 330XLRHD STAND ALONE



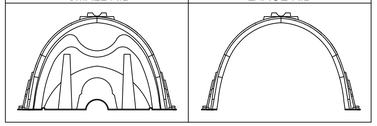
MODEL 330XLSHD STARTER

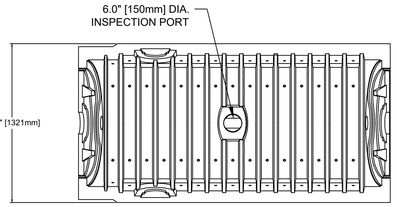


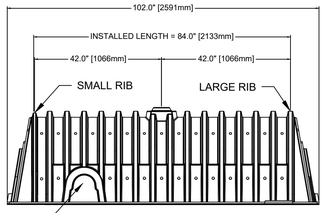
MODEL 330XLIHD INTERMEDIATE



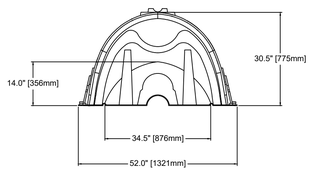
MODEL 330XLEHD END







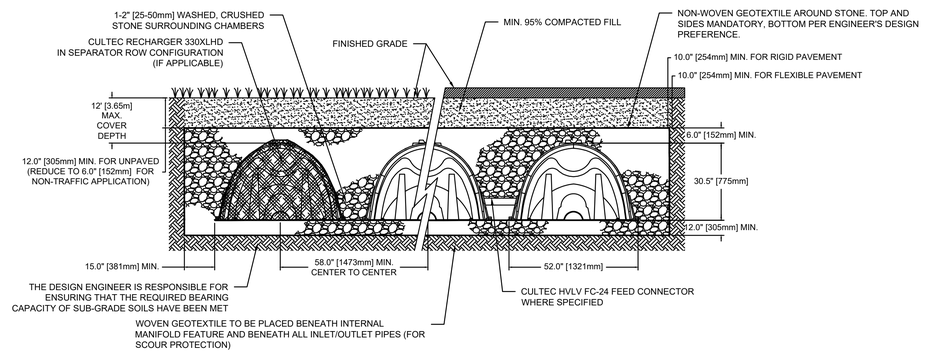
SIDE PORTAL FOR OPTIONAL INTERNAL MANIFOLD
(ACCOMMODATES CULTEC HVLV FC-48 FEED CONNECTOR OR STORM PIPE)
MAXIMUM PIPE SIZE:
12" [300mm] PVC
10" [250mm] HDPE



CULTEC RECHARGER 330XLHD CHAMBER STORAGE = 7.459 CF/FT [0.693 m³/m]
INSTALLED LENGTH ADJUSTMENT = 1.5' [0.46 m]
SIDE PORTAL ACCEPTS CULTEC HVLV FC-24 FEED CONNECTOR

CULTEC RECHARGER 330XLHD
HEAVY DUTY THREE VIEW

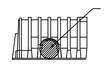
(NOT TO SCALE)



CULTEC RECHARGER
330XLHD CROSS SECTION

(NOT TO SCALE)

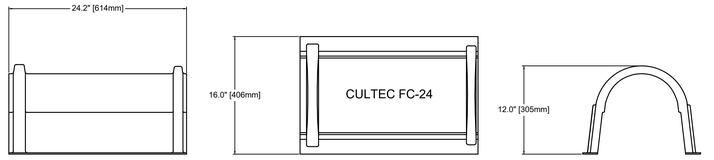
FIGURE 1



ZOOM OF SIDE PORTAL SHOWING MAX. PIPE O.D.

CULTEC SEPARATOR ROW

(NOT TO SCALE)



CULTEC HVLV FC-24 FEED CONNECTOR PRODUCT SPECIFICATIONS
GENERAL
CULTEC HVLV FC-24 FEED CONNECTORS ARE DESIGNED TO CREATE AN INTERNAL MANIFOLD FOR CULTEC RECHARGER MODEL 330XLHD STORMWATER CHAMBERS.

CHAMBER PARAMETERS
1. THE CHAMBERS SHALL BE MANUFACTURED BY CULTEC, OF BROOKFIELD, CT. (203-775-4416 OR 1-800-428-5832)
2. THE CHAMBER SHALL BE VACUUM THERMOFORMED OF HIGH MOLECULAR WEIGHT HIGH DENSITY POLYETHYLENE (HMWHDPE) WITH A BLACK INTERIOR AND BLUE EXTERIOR.
3. THE CHAMBER SHALL BE ARCHED IN SHAPE.
4. THE CHAMBER SHALL BE OPEN-BOTTOMED.
5. THE NOMINAL CHAMBER DIMENSIONS OF THE CULTEC HVLV FC-24 FEED CONNECTOR SHALL BE 12 INCHES (305 mm) TALL, 16 INCHES (406 mm) WIDE AND 24.2 INCHES (614 mm) LONG.
6. THE NOMINAL STORAGE VOLUME OF THE HVLV FC-24 FEED CONNECTOR SHALL BE 0.913 FT³ / FT (0.085 m³ / m) - WITHOUT STONE.
7. THE HVLV FC-24 FEED CONNECTOR CHAMBER SHALL HAVE 2 CORRUGATIONS.
8. THE HVLV FC-24 FEED CONNECTOR MUST BE FORMED AS A WHOLE CHAMBER HAVING TWO OPEN END WALLS AND HAVING NO SEPARATE END PLATES OR SEPARATE END WALLS. THE UNIT SHALL FIT INTO THE SIDE PORTALS OF THE CULTEC RECHARGER STORMWATER CHAMBER AND ACT AS CROSS FEED CONNECTIONS CREATING AN INTERNAL MANIFOLD.
9. THE CHAMBER SHALL BE DESIGNED TO WITHSTAND TRAFFIC LOADS WHEN INSTALLED ACCORDING TO CULTEC'S RECOMMENDED INSTALLATION INSTRUCTIONS.
10. THE CHAMBER SHALL BE MANUFACTURED IN AN ISO 9001:2015 CERTIFIED FACILITY.

CULTEC HVLV FC-24
FEED CONNECTOR THREE VIEW

(NOT TO SCALE)

DRAWN BY: CMK	DESIGNED BY: FAK
CHECKED BY: FAK	APPROVED BY: AD

REVISIONS

2	07/31/25	SITE PLAN REVIEW COMMITTEE COMMENTS
1	11/15/24	REVISED SET
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COMMONWEALTH OF MASSACHUSETTS
JOSEPH D. PEZNOLA
CIVIL
No. 38117
REGISTERED PROFESSIONAL ENGINEER

DATE: 12-18-23

SCALE: AS NOTED

SHEET: C-10

17 NELLS WAY

ORLEANS, MASSACHUSETTS

DETAILS

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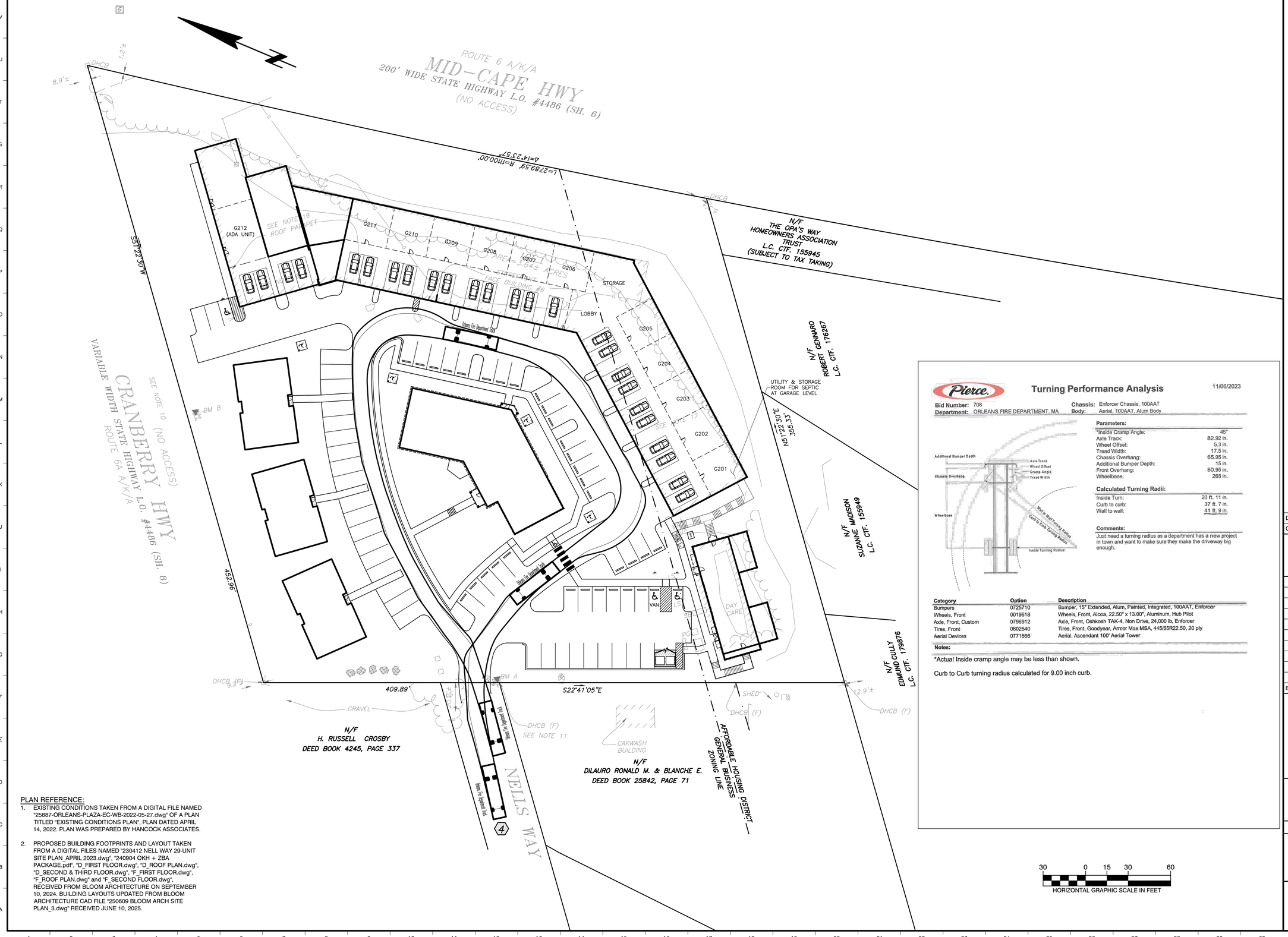
File Name: \\han-bbsds01\CAD-2\Civil 3D Projects\25887 - Maple Hurst Builders - Orleans\Eng\DWG\25887sp55.dwg Saved:7/31/2025 1:08 PM Plotted: Jul 31, 2025 1:23:55pm
Tab: C-10 Details 1 Plot Style: 1050C.CTB Plotted By: Chi M. Kwan
25887sp55.dwg Saved: 7/31/2025 1:08 PM Plotted: Jul 31, 2025 1:23:pm



PLAN REFERENCE:

1. EXISTING CONDITIONS TAKEN FROM A DIGITAL FILE NAMED "25887-ORLEANS-PLAZA-EC-WB-2022-05-27.dwg" OF A PLAN TITLED "EXISTING CONDITIONS PLAN", PLAN DATED APRIL 14, 2022. PLAN WAS PREPARED BY HANCOCK ASSOCIATES.

2. PROPOSED BUILDING FOOTPRINTS AND LAYOUT TAKEN FROM A DIGITAL FILES NAMED "230412 NELL WAY 29-UNIT SITE PLAN_APRIL 2023.dwg", "240904 OKH + ZBA PACKAGE.pdf", "D_FIRST FLOOR.dwg", "D_ROOF PLAN.dwg", "D_SECOND & THIRD FLOOR.dwg", "F_FIRST FLOOR.dwg", "F_ROOF PLAN.dwg" and "F_SECOND FLOOR.dwg", RECEIVED FROM BLOOM ARCHITECTURE ON SEPTEMBER 10, 2024. BUILDING LAYOUTS UPDATED FROM BLOOM ARCHITECTURE CAD FILE "250609 BLOOM ARCH SITE PLAN_3.dwg" RECEIVED JUNE 10, 2025.

HORIZONTAL GRAPHIC SCALE IN FEET
30 0 15 30 60

Turning Performance Analysis

11/06/2023

Bid Number: 708
Department: ORLEANS FIRE DEPARTMENT, MA
Chassis: Enforcer Chassis, 100AAT
Body: Aerial, 100AAT, Alum Body

Parameters:

*Inside Cramp Angle:	45°
Axle Track:	82.92 in.
Wheel Offset:	5.3 in.
Tread Width:	17.5 in.
Chassis Overhang:	65.95 in.
Additional Bumper Depth:	15 in.
Front Overhang:	80.95 in.
Wheelbase:	265 in.

Calculated Turning Radii:

Inside Turn:	20 ft. 11 in.
Curb to curb:	37 ft. 7 in.
Wall to wall:	41 ft. 9 in.

Comments:
Just need a turning radius as a department has a new project in town and want to make sure they make the driveway big enough.

Category	Option	Description
Bumpers	0725710	Bumper, 15" Extended, Alum, Painted, Integrated, 100AAT, Enforcer
Wheels, Front	0019618	Wheels, Front, Alcoa, 22.50" x 13.00", Aluminum, Hub Pilot
Axle, Front, Custom	0796912	Axle, Front, Oshkosh TAK-4, Non Drive, 24,000 lb, Enforcer
Tires, Front	0802640	Tires, Front, Goodyear, Armor Max MSA, 445/65R22.50, 20 ply
Aerial Devices	0771866	Aerial, Ascendant 100' Aerial Tower

Notes:
*Actual Inside cramp angle may be less than shown.

Curb to Curb turning radius calculated for 9.00 inch curb.

DRAWN BY: CMK	DESIGNED BY: FAK
CHECKED BY: AD	APPROVED BY: JP

REVISIONS

ISSUE	DATE	DESCRIPTION
2	07/31/25	SITE PLAN REVIEW COMMITTEE COMMENTS
1	11/15/24	REVISED SET

COMMONWEALTH OF MASSACHUSETTS
JOSEPH D. PEZNOLA
CIVIL
No. 38117
REGISTERED PROFESSIONAL ENGINEER

DATE: 12-18-23
SCALE: 1" =30'
SHEET: C-11

17 NELLS WAY

ORLEANS, MASSACHUSETTS

FIRE TRUCK SWEPT PATH PLAN

H.W. Moore ASSOCIATES
CIVIL ENGINEERING | LAND PLANNING
A DIVISION OF HANCOCK SURVEY ASSOCIATES
121 E. Berkeley Street, 4th Floor, Boston, MA 02118
tel: 617-357-8145 fax: 617-357-9495 web: hwmoore.com

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Xref: C-Fire Truck, Plot Style: 1050C.CTB Plotted By: Chi M. Kwan
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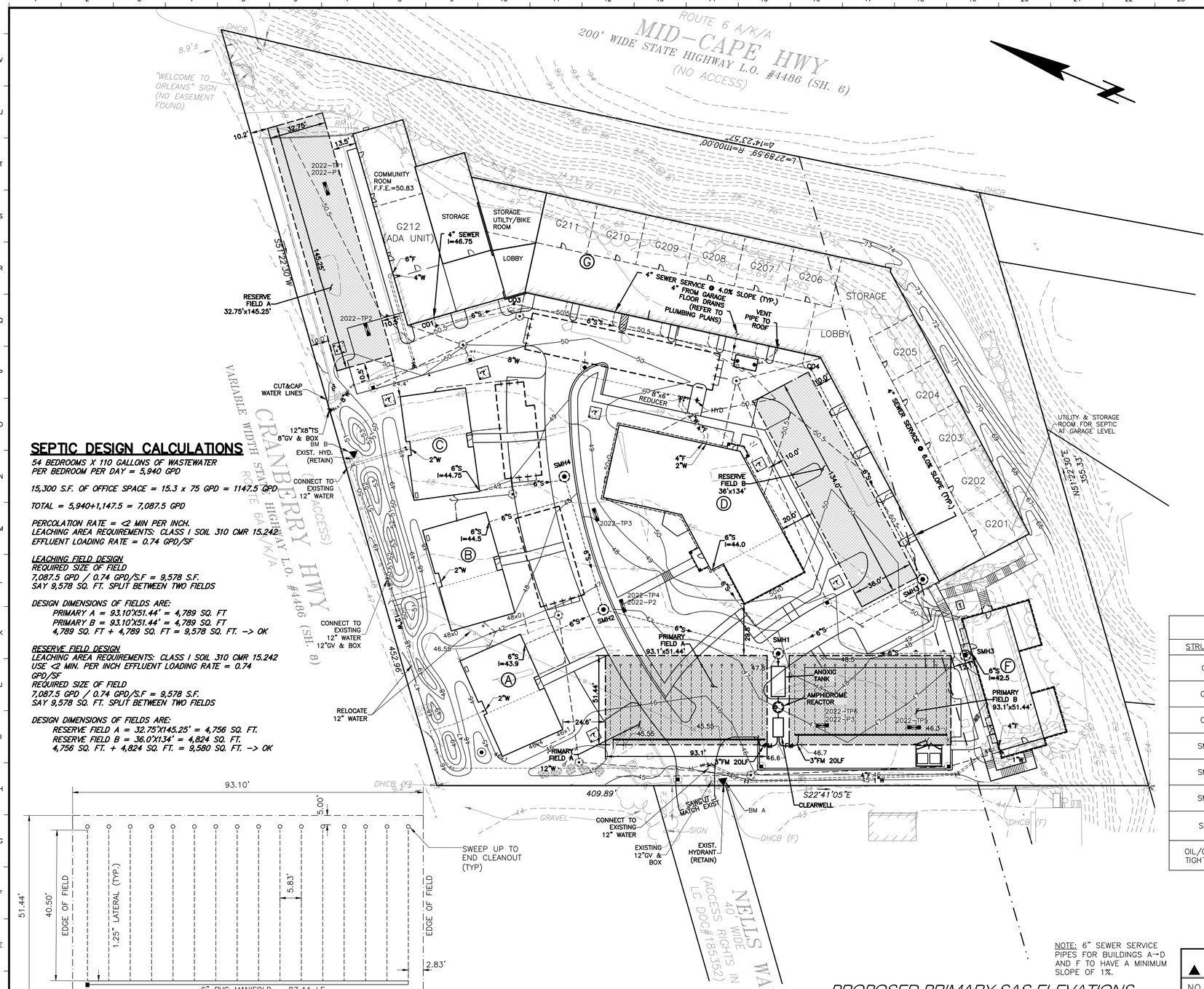

SEPTIC DESIGN CALCULATIONS

54 BEDROOMS X 110 GALLONS OF WASTEWATER PER BEDROOM PER DAY = 5,940 GPD

15,300 S.F. OF OFFICE SPACE = 15.3 x 75 GPD = 1147.5 GPD

TOTAL = 5,940+1,147.5 = 7,087.5 GPD

PERCOLATION RATE = <2 MIN PER INCH.
LEACHING AREA REQUIREMENTS: CLASS I SOIL 310 CMR 15.242
EFFLUENT LOADING RATE = 0.74 GPD/SF

LEACHING FIELD DESIGN
REQUIRED SIZE OF FIELD
7,087.5 GPD / 0.74 GPD/S.F = 9,578 S.F.
SAY 9,578 SQ. FT. SPLIT BETWEEN TWO FIELDS

DESIGN DIMENSIONS OF FIELDS ARE:
PRIMARY A = 93.10'X51.44' = 4,789 SQ. FT
PRIMARY B = 93.10'X51.44' = 4,789 SQ. FT
4,789 SQ. FT + 4,789 SQ. FT = 9,578 SQ. FT. -> OK

RESERVE FIELD DESIGN
LEACHING AREA REQUIREMENTS: CLASS I SOIL 310 CMR 15.242
USE <2 MIN. PER INCH EFFLUENT LOADING RATE = 0.74 GPD/SF
REQUIRED SIZE OF FIELD
7,087.5 GPD / 0.74 GPD/S.F = 9,578 S.F.
SAY 9,578 SQ. FT. SPLIT BETWEEN TWO FIELDS

DESIGN DIMENSIONS OF FIELDS ARE:
RESERVE FIELD A = 32.75'X145.25' = 4,756 SQ. FT.
RESERVE FIELD B = 36.0'X134' = 4,824 SQ. FT.
4,756 SQ. FT. + 4,824 SQ. FT. = 9,580 SQ. FT. -> OK

LEACH FIELD LAYOUT

N.T.S.

NOTES:

1. UNLESS OTHERWISE NOTED ON THIS PLAN, ALL EXISTING SEPTIC/SEWER STRUCTURE/PIPES TO BE REMOVED.
2. FOR DETAILED INFORMATION ON THE PROPOSED ANOXIC EQUALIZER, AMPHIDROME REACTOR, CLEAR WELL, AND LEACHING FIELD, SEE DETAIL SHEETS.
3. BASE SURVEY INFORMATION SHOWN HEREON FROM A TOPOGRAPHIC SURVEY DONE BY HANCOCK ASSOCIATES ON APRIL 14, 2022.
4. ADDITIONAL DETAILS FOR AMPHIDROME CONTROLS, INTERIOR TREATMENT, AND EQUIPMENT TO BE COORDINATED BETWEEN OWNER AND CONTRACTOR (RF MAHONEY, SUPPLIER OF SYSTEM).
5. SYSTEM OWNER TO NAME A LICENSED OPERATOR OF THE AMPHIDROME SYSTEM PRIOR TO INSTALLATION.
6. SITE SHALL BE EQUIPPED WITH A PERMANENT EMERGENCY GENERATOR CONNECTED TO ALL SYSTEM EQUIPMENT.
7. LOCATIONS OF EXISTING UNDERGROUND UTILITIES / OBSTRUCTIONS / SYSTEMS SHOWN HEREON ARE APPROXIMATE ONLY. ALL UTILITIES/OBSTRUCTIONS/SYSTEMS MAY NOT BE SHOWN. CONTRACTOR SHALL BE RESPONSIBLE FOR LOCATING AND PROTECTING ALL UNDERGROUND UTILITIES/OBSTRUCTIONS/SYSTEMS, WHETHER OR NOT SHOWN HEREON.
8. CONTRACTOR SHALL BE RESPONSIBLE FOR REPAIR AND/OR REPLACEMENT OF ANY EXISTING IMPROVEMENTS DAMAGED DURING CONSTRUCTION THAT ARE NOT DESIGNATED FOR DEMOLITION AND / OR REMOVAL HEREON. DAMAGED IMPROVEMENTS SHALL BE REPAIRED TO THE SATISFACTION OF THEIR RESPECTIVE OWNERS.
9. ANY INTENDED REVISION OF THE HORIZONTAL AND/OR VERTICAL LOCATION OF IMPROVEMENTS TO BE CONSTRUCTED AS SHOWN HEREON SHALL BE REVIEWED AND APPROVED BY ENGINEER PRIOR TO IMPLEMENTATION.
10. RIM ELEVATIONS SHOWN FOR NEW STRUCTURES ARE APPROXIMATE AND ARE PROVIDED TO ASSIST CONTRACTOR WITH MATERIAL TAKEOFFS. FINISH RIM ELEVATIONS SHOULD MATCH PAVEMENT, GRADING OR LANDSCAPING, UNLESS SPECIFICALLY INDICATED OTHERWISE.
11. WHERE EXISTING UTILITY LINES/STRUCTURES ARE TO BE CUT/BROKEN DOWN/ ABANDONED, LINES/STRUCTURES SHALL BE PLUGGED/CAPPED/FILLED IN ACCORDANCE WITH OWNER REQUIREMENTS.
12. CONTRACTOR SHALL CONTACT DIG-SAFE FOR UNDERGROUND UTILITY MARKING AT 1-888-344-7233 AT LEAST 72 HOURS PRIOR TO COMMENCEMENT OF ANY WORK.
13. CONTRACTOR SHALL MAKE HIMSELF AWARE OF ALL CONSTRUCTION REQUIREMENTS, CONDITIONS, AND LIMITATIONS IMPOSED BY PERMITS AND APPROVALS ISSUED BY REGULATORY AUTHORITIES PRIOR TO COMMENCEMENT OF ANY WORK. CONTRACTOR SHALL COORDINATE AND OBTAIN ALL CONSTRUCTION PERMITS REQUIRED BY REGULATORY AUTHORITIES.
14. ALL WORK OUTSIDE OF BUILDING THAT IS LESS THAN 10 FEET FROM THE INSIDE FACE OF BUILDING FOUNDATIONS SHALL CONFORM WITH THE UNIFORM STATE PLUMBING CODE OF MASSACHUSETTS, 248 CMR 2.00.
15. HANCOCK ASSOCIATES AND FR MAHONEY & ASSOCIATES SHALL BE RETAINED TO SUPERVISE SYSTEM INSTALLATION.
16. SOIL TESTING CONDUCTED BY HANCOCK ASSOCIATES ON DECEMBER 6, 2022. TEST WITNESSED BY KELLY MESSIER OF THE ORLEANS BOARD OF HEALTH. SUPPLEMENTAL SOIL TESTING FOR RESERVE FIELD B, WITNESSED BY AN ORLEANS BOH OFFICIAL, WILL BE REQUIRED AT A FUTURE DATE SHOULD RESERVE FIELD B REQUIRE IMPLEMENTATION. WITNESSED TEST PITS AND PERCOLATION TESTS ARE IDENTIFIED AS 2022-TP1 THROUGH 2022-TP6 AND 2022-P1 THROUGH 2022-P3 ON THE PLANS.

SEWER SCHEDULE

STRUCTURE	RIM ELEV.	INVERT ELEV.	PIPE LENGTH	PIPE SLOPE
CO1	50.55	47.60 (6")	CO1 → CO3 46 LF	S=0.012
CO3	50.8	47.03 (6")	CO3 → CO4 175 LF	S=0.012
CO4	50.65	44.93 (6")	CO4 → SMH3 134 LF	S=0.012
SMH3	47.10	43.32 (6"IN) 43.22 (6"OUT)	SMH3 → SMH1 86 LF	S=0.02
SMH2	46.6	43.10 (6"IN) 43.00 (6"OUT)	SMH2 → SMH1 100 LF	S=0.015
SMH4	48.25	44.70 (6"IN) 44.60 (6"OUT)	SMH4 → SMH2 74 LF	S=0.02
SMH1	48.1	41.50 (6"IN) 41.40 (6"OUT)	SMH1 → ANOXIC TANK 7 LF	S=0.011
OIL/GREASE TIGHT TANK	50.55	46.20 (4"IN)	4" FROM GARAGE FLOOR DRAINS LENGTH TBD	S=0.010 (MIN.)

NOTE: 6" SEWER SERVICE PIPES FOR BUILDINGS A→D AND F TO HAVE A MINIMUM SLOPE OF 1%.

ELEVATION BENCH MARKS

DATUM: NAVD88

NO.	DESCRIPTION	ELEV.
BM A	PUNCH MARK ON HYD BOLT OVER MAIN OUTLET WITH TAG BOLT #781*	46.68'
BM B	PUNCH MARK ON HYD BOLT OVER MAIN OUTLET WITH TAG BOLT #790*	51.99'

**BOLTS WITH PUNCHMARKS USED FOR BENCHMARK LOCATION; TAG BOLT NOT USED BUT LISTED HERON FOR HYDRANT IDENTIFICATION.*

PROPOSED RESERVE SAS ELEVATIONS

FIELD	MIN PROPOSED GRADE**	MAX PROPOSED GRADE	TOP AND B.O. EL.	LATERAL INVERT	BOTTOM FIELD	EXISTING GRADE	GROUND WATER ELEV	OFFSET
BOTH	49.00	51.25	48.25	46.70	46.20	49.85	35.85	10.35

PROPOSED PRIMARY SAS ELEVATIONS

FIELD	MIN PROPOSED GRADE**	MAX PROPOSED GRADE	TOP AND B.O. EL.	LATERAL INVERT	BOTTOM FIELD	MAX EXISTING GRADE	GROUND WATER ELEV	OFFSET
A	45.55	47.80	44.80	43.25	42.75	46.0	34.0	8.75
B	46.35	48.60	45.60	44.05	43.55	46.9	35.6	7.98

TEST PIT TP-1 (EL. 49.5±)

DEPTH	LAYER	TEXTURAL CLASSIFICATION	REDOXIMORPHIC FEATURES
0"-56"	C1	SAND	NONE
56"-168"	C2	SANDY LOAM	NONE
NO OBSERVABLE GROUNDWATER/ESHGW ESHGW SET AT BOTTOM (35.5) PERC RATE = < 2 MIN. PER INCH			

TEST PIT TP-2 (EL. 49.4±)

DEPTH	LAYER	TEXTURAL CLASSIFICATION	REDOXIMORPHIC FEATURES
0"-132"	C1	V-FINE SAND (VFS)	NONE
NO OBSERVABLE GROUNDWATER/ESHGW ESHGW SET AT BOTTOM (38.4)			

TEST PIT TP-3 (EL. 47.8±)

DEPTH	LAYER	TEXTURAL CLASSIFICATION	REDOXIMORPHIC FEATURES
0"-110"	C1	COARSE MED. SAND	NONE
110"-144"	C2	FINE SAND	NONE
NO OBSERVABLE GROUNDWATER/ESHGW ESHGW SET AT BOTTOM (35.8)			

TEST PIT TP-4 (EL. 46.5±)

DEPTH	LAYER	TEXTURAL CLASSIFICATION	REDOXIMORPHIC FEATURES
0"-58"	C1	COARSE MED. SAND	NONE
58"-144"	C2	FINE SAND	NONE
NO OBSERVABLE GROUNDWATER/ESHGW ESHGW SET AT BOTTOM (34.5) PERC RATE = < 2 MIN. PER INCH			

TEST PIT TP-5 (EL. 46.2±)

DEPTH	LAYER	TEXTURAL CLASSIFICATION	REDOXIMORPHIC FEATURES
0"-52"	C1	COARSE MED. SAND	NONE
52"-132"	C2	FINE SAND	NONE
NO OBSERVABLE GROUNDWATER/ESHGW ESHGW SET AT BOTTOM (35.2)			

TEST PIT TP-6 (EL. 45.2±)

DEPTH	LAYER	TEXTURAL CLASSIFICATION	REDOXIMORPHIC FEATURES
0"-48"	C1	COARSE MED. SAND	NONE
48"-136"	C2	FINE SAND	NONE
NO OBSERVABLE GROUNDWATER/ESHGW ESHGW SET AT BOTTOM (33.9) PERC RATE = < 2 MIN. PER INCH			

PLAN REFERENCE:

1. EXISTING CONDITIONS TAKEN FROM A DIGITAL FILE NAMED "25887-ORLEANS-PLAZA-EC-WB-2022-05-27.dwg" OF A PLAN TITLED "EXISTING CONDITIONS PLAN", PLAN DATED APRIL 14, 2022. PLAN WAS PREPARED BY HANCOCK ASSOCIATES.
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DRAWN BY: CMK/RMD	DESIGNED BY: JTL/RMD
CHECKED BY: JTL/FAK	APPROVED BY: JP

30 0 15 30 60
HORIZONTAL GRAPHIC SCALE IN FEET

REVISIONS

ISSUE	DATE	DESCRIPTION
4	7/31/25	LEASING OFFICE SPACE ADDED
3	03/21/25	BOH COMMENTS
2	03/03/25	BOH COMMENTS
1	11/15/24	GENERAL REVISIONS

COMMONWEALTH OF MASSACHUSETTS
JOSEPH D. PEZNOLA
CIVIL
No. 38117
REGISTERED PROFESSIONAL ENGINEER

DATE: 12-18-23

SCALE: 1" =30'

SHEET: SDS-1

17 NELLS WAY

ORLEANS, MASSACHUSETTS

SEWAGE DISPOSAL SYSTEM PLAN

H.W. Moore ASSOCIATES
CIVIL ENGINEERING | LAND PLANNING
A DIVISION OF HANCOCK SURVEY ASSOCIATES
121 E. Berkeley Street, 4th Floor, Boston, MA 02118
tel: 617-357-8145 fax: 617-357-9495 web: hwmoore.com

File Name: O:\Civil 3D Projects\25887 - Maple Hunt Builders - Orleans\Eng\DWG\25887sp55-SDS JTL R5.dwg Saved 7/31/2025 2:51 PM. Plotted: Jul 31, 2025 2:52:22pm
Tab: SDS-1 Plot Styler: 1050C.ctb Plotted By: Chris Kwan
25887sp55-SDS JTL R5.dwg Saved: 7/31/2025 2:51 PM Plotted: Jul 31, 2025 2:52:pm

PERFORATION & LATERAL SIZE CALCULATION – SINGLE PRIMARY FIELD

PERFORATION DIAMETER = SAY 1/4"
PERFORATION SPACING = SAY 4.5' CENTER TO CENTER
LATERAL LENGTH = 40.5'
N=# OF PERFORATIONS IN LATERAL = 40.5/4.5 = 9

ORIFICE EQUATION: $q=11.79d^2h_d^{0.5}$

q=PERFORATION DISCHARGE RATE (GPM)
d=PERFORATION DIAMETER (IN) = 0.25"
h_d= IN-LINE DISTAL HEAD PRESSURE (FT HEAD) = 3'

$q=(11.79)(0.25)^2(3)^{0.5}$= 1.28 (GPM)

TOTAL LATERAL DISCHARGE RATE = qxN = (1.28)(9) = 11.52 (GPM)
TOTAL FIELD DISCHARGE RATE = 15 LATERALS x 11.52 = 172.8 GPM

LATERAL SIZE = 1.25"ø PER APPENDIX B OF "DESIGN GUIDANCE"

MANIFOLD SIZE CALCULATION – SINGLE PRIMARY FIELD

ONE END MANIFOLD SECTION

F_i = FRICTION FACTOR FOR MANIFOLD SECTION $=(0.00098)(Q_i)^{1.85}$
Q_i = FLOW IN MANIFOLD SEGMENT (GPM) = 171.45 GPM
$F_i = (0.00098)(171.45)^{1.85} = 13.32$

$D_m = [(\sum_{i=1}^{M}(L_i*F_i))/(f*h_d)]^{0.21}$, WHERE

M = # MANIFOLD SEGMENTS = 1
L_i = LENGTH OF MANIFOLD SEGMENT (FT) = 80.5 FT
F_i = 13.32
f = FRACTION OF TOTAL HEADLOSS, MUST BE ≤ 10% = SAY 8% = 0.08
h_d = 3'

$D_m = [(80.5*13.32)/(0.08*3)]^{0.21}$ = 5.84 IN => USE 6"ø MANIFOLD

DOSE VOLUME CALCULATION – BOTH PRIMARY FIELDS

DISTRIBUTION LATERAL NETWORK VOLUME
= 2 FIELDS * # LATERALS * LATERAL LENGTH * X-SEC AREA
= (2)*(15)*(40.5')*(π*(1.25"/12)^2/4) = 10.4 C.F. = 77.5 GAL

NOTE: LATERAL VOLUME EXCLUDES MANIFOLD AND DELIVERY LINE (PER STEP 6 OF "DESIGN GUIDANCE")

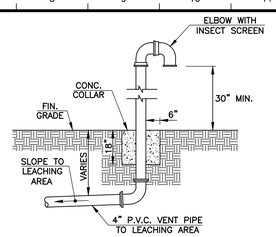
DESIGN DOSE VOLUME BETWEEN 5 AND 10 TIMES LATERAL VOLUME
DESIGN DOSE VOLUME = 77.5 GAL * (5 TO 10) = 388 TO 775 GAL

DOSE AS OFTEN AS POSSIBLE (PER DESIGN MANUAL)
SET DAILY DOSE RATE TO 10 TIMES A DAY

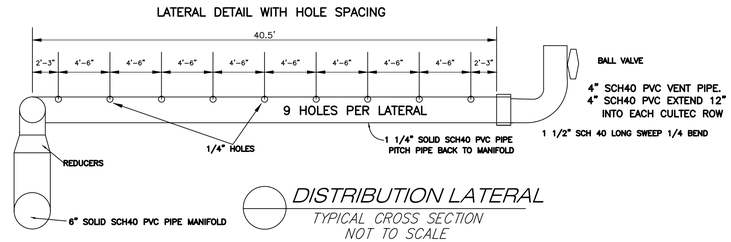
DOSE VOLUME = 7,088 GPD / 10 DOSES PER DAY = 709 GAL/DOSE –> OK

PRESSURE DISTRIBUTION CALCULATIONS

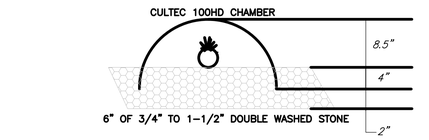
PER MASSDEP "TITLE 5 PRESSURE DISTRIBUTION DESIGN GUIDANCE" DOCUMENT, AS APPROVED 5/24/2002



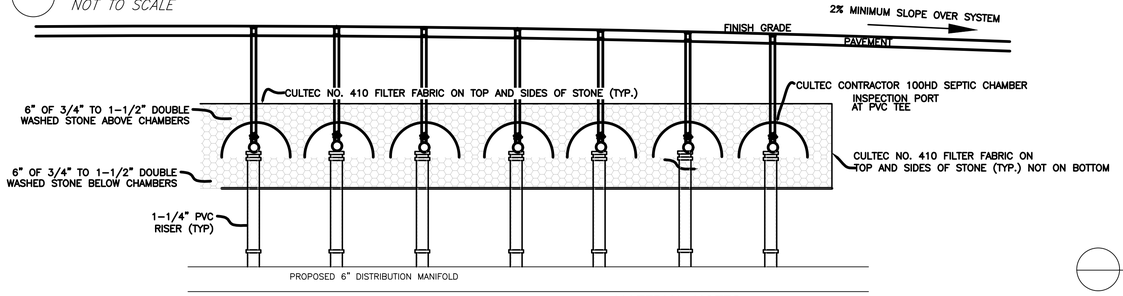
VENT DETAIL
NOT TO SCALE



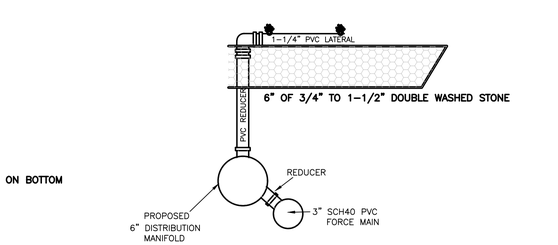
DISTRIBUTION LATERAL
TYPICAL CROSS SECTION NOT TO SCALE



CULTEC CHAMBER EMBEDMENT
TYPICAL CROSS SECTION NOT TO SCALE



LEACHING FIELD
TYPICAL CROSS SECTION NOT TO SCALE

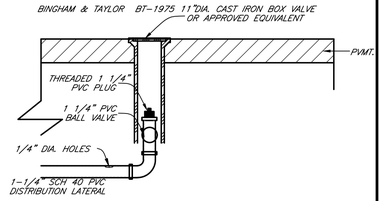


DISTRIBUTION MANIFOLD CONNECTIONS
TYPICAL CROSS SECTION NOT TO SCALE

MATERIAL NOTES:

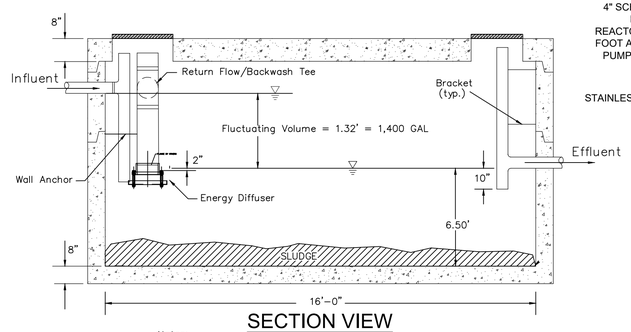
LEACH BEDDING:

1. *CLEAN DOUBLE WASHED STONE SHALL BE FREE OF IRON PARTICLES, FINES AND DUST IN PLACE.*
2. *STONE IN LEACH AREA SHALL BE 3/4" TO 1-1/2" DOUBLE WASHED STONE AS INDICATED IN NOTE 1 ABOVE.*
3. *TOP AND SIDES ON STONE TO BE LINES WITH CULTEC NO. 410 FILTER FABRIC.*



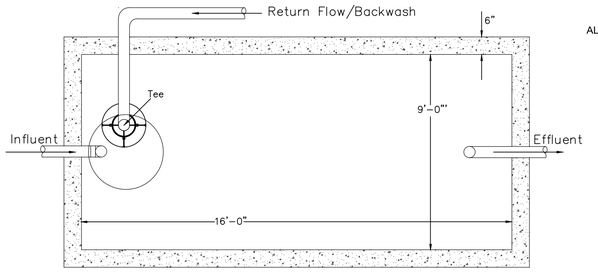
1-1/4" PVC CLEAN-OUT TO BE ATTACHED TO 1=1/4" PVC PRESSURE LATERAL WITH A 1/4" BEND LONG SWEEP PVC PIPE. 1-1/4" PVC CLEAN-OUT PIPE TO BE THREADED AND CAPPED. CLEAN-OUT ASSEMBLY TO BE COVERED WITH B&T 11" DIA. CAST IRON VALVE BOX BT-1975 OR EQUIVALENT STRUCTURE SUITABLE FOR H-20 LOADING REQUIREMENTS. BOX TO BE SET FLUSH WITH PAVEMENT, AND SHOULD EXTEND TO THE TOP OF STONE. CLEAN-OUTS TO BE PLACED AT THE END OF ALL PRESSURE LATERALS.

LEACH FIELD CLEANOUT DETAIL
TYPICAL NOT TO SCALE

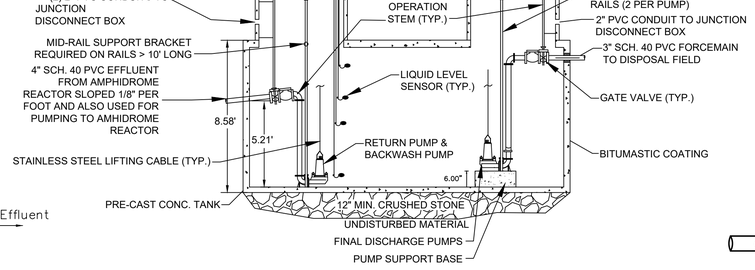


SECTION VIEW

Notes:
Effluent Tee should extend into riser.
Effluent line invert should be at an absolute minimum of 6.5 ft. from the bottom.
Stilling Well rim to be 2" above effluent invert.
Stilling Well to be accessible from manhole opening.

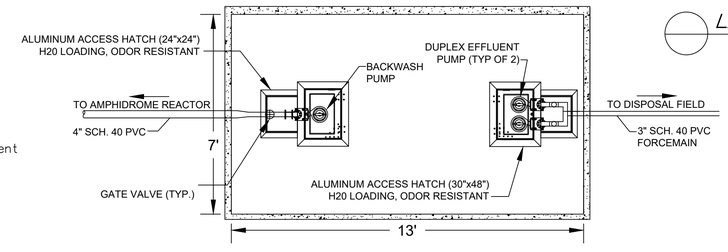


PLAN VIEW
ANOXIC TANK DETAIL
N.T.S.

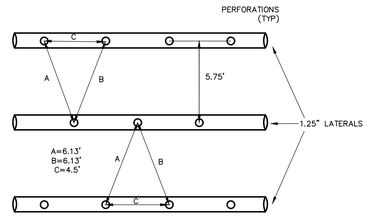


SECTION VIEW

NOTES:
1. ALL TANK ELEVATIONS AND DIMENSIONS TO BE VERIFIED PRIOR TO CONSTRUCTION.
2. LOW FLOAT SHOULD BE SET FOR MINIMUM SUBMERGENCE OF RETURN PUMP.
3. MIDDLE FLOAT WILL BE SET AT START UP.
4. HIGH FLOAT SHOULD BE SET AT THE ELEVATION OF THE INLET INVERT.
5. CAPACITY OF TANK IS APPROXIMATELY 681 GAL/FT.
6. RETURN & BACKWASH PUMP (AT 170 GPM @ 20 FT TDH).

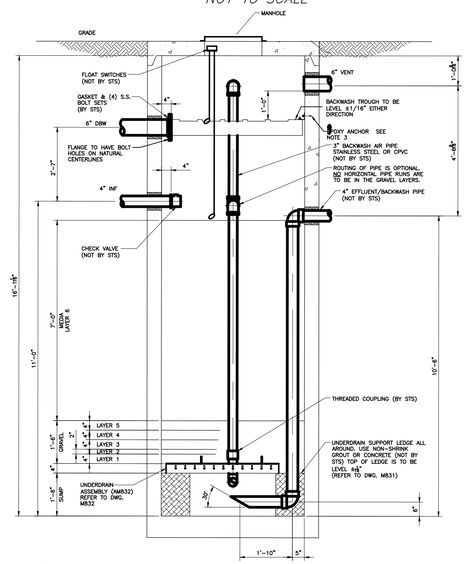


PLAN VIEW
CLEARWELL TANK DETAIL
N.T.S.



LATERAL DIAMETER:
LATERAL LENGTH= 40.5 FEET
FIGURE 8a: MINIMUM DIAMETER FOR A 40.5 FT. LATERAL WITH 4.5 FT. PERFORATION SPACING IS 1.25 INCHES

LATERAL PERFORATION LAYOUT
TYPICAL NOT TO SCALE



AMPHIDROME REACTOR
PER "5'-0" DIA. AMPHIDROME™ REACTOR" BY SEVERN TRENT SERVICES (STS) NOT TO SCALE

DRAWN BY: CMK/RMD	DESIGNED BY: JTL/RMD
CHECKED BY: JTL/FAK	APPROVED BY: JP

REVISIONS		
4	7/31/25	LEASING OFFICE SPACE ADDED
3	03/21/25	BOH COMMENTS
2	03/03/25	BOH COMMENTS
1	11/15/24	GENERAL REVISIONS
ISSUE	DATE	DESCRIPTION

COMMONWEALTH OF MASSACHUSETTS
JOSEPH D. PEZWOLA
CIVIL
No. 38117
REGISTERED PROFESSIONAL ENGINEER

DATE: 12-18-23

SCALE: AS NOTED

SHEET: SDS-2

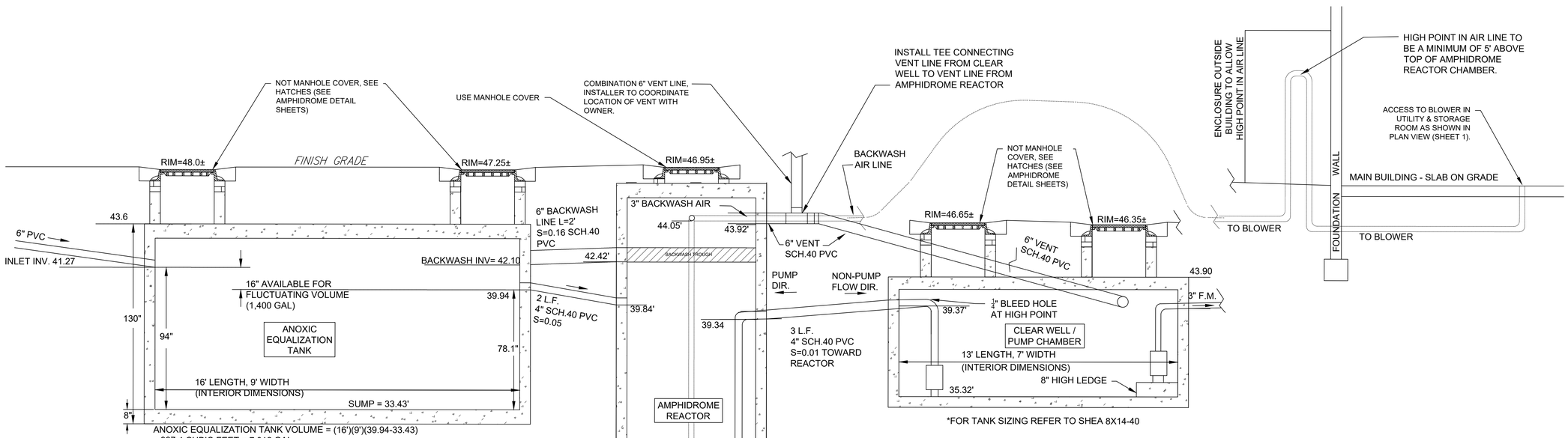
17 NELLS WAY

ORLEANS, MASSACHUSETTS

SEWAGE DISPOSAL SYSTEM DETAILS

H.W. Moore ASSOCIATES
CIVIL ENGINEERING | LAND PLANNING
A DIVISION OF HANCOCK SURVEY ASSOCIATES
121 E. Berkeley Street, 4th Floor, Boston, MA 02118
tel: 617-357-8145 fax: 617-357-9495 web: hwmoore.com

File Name: O:\Civil 3D Projects\25887 - Maple Hurst Builders - Orleans\Eng\DWG\25887sp55-SDS JTL R5.dwg Saved 7/31/2025 2:51 PM Plotted: Jul 31, 2025 2:52:41pm
Tab: SDS-2 Plot Style: 1050CTB Plotted By: CMK Xref:
25887sp55-SDS JTL R5.dwg Saved: 7/31/2025 2:51 PM Plotted: Jul 31, 2025 2:52:pm



ANOXIC EQUALIZATION TANK VOLUME = (16')(9')(39.94-33.43)
= 937.4 CUBIC FEET = 7,012 GAL.

*SEE SHEA ITEM NUMBER 10X17-90 FOR PRECAST TANK DIMENSIONS (USE 9,000 GAL PRECAST TANK).

*FOR TANK SIZING REFER TO SHEA 8X14-40

DAILY DOSE RATE = 10 DOSES PER DAY (ONCE EVERY 2.4 HOURS)
DOSE VOLUME = 912 GAL (632 GAL DOSE PLUS 280 GAL BACKFLOW)
PUMP FLOW RATE (Q) = 175 GPM (INSTALL BALL VALVES ON EFFLUENT PUMP OUTLETS TO LIMIT FLOW RATE TO 175 GPM)
RUN TIME = 714 GAL / 175 GPM = 4.1 MIN
FORCEMAIN XSEC AREA = $\pi*D^2/4 = \pi*(3"/12)^2/4 = 0.049$ SF
FORCEMAIN VELOCITY = Q/A = (175 GPM)/(7.48GAL/CF)/(60) / (0.049) = 7.9 FPS

TO FIELD A

STATIC HEAD LOSS = LATERAL INVERT – PUMP ELEVATION = 43.25–36.32 = 6.9 FT

FRICTIONAL HEAD LOSS = FORCEMAIN LOSS
MATERIAL COEFFICIENT = C = 150 (PVC FORCEMAIN)
FORCE MAIN DIAMETER = D = 3 IN
FORCEMAIN LENGTH = L = 20 FT
EQUIVALENT LENGTH OF FITTINGS = 9.8 FT (1)–90° ELBOW (8.1' E.L.), (1)–GATE VALVE (1.7' E.F.)

DESIGN PIPE LENGTH = 20 FT + 9.8 FT = 30 FT

FRICTIONAL HEAD LOSS IN FORCE MAIN (HAZEN–WILLIAMS FORMULA):
Hf = 0.002083 x L x (100x Q/C)^1.85 / D^4.8655 = 1.49 FT

TOTAL DYNAMIC HEAD = STATIC + FRICTIONAL = 6.9 + 1.5 ≈ 9 FT

TO FIELD B

STATIC HEAD LOSS = LATERAL INVERT – PUMP ELEVATION = 44.05–36.32 = 7.7 FT

FRICTIONAL HEAD LOSS = FORCEMAIN LOSS
MATERIAL COEFICIENT = C = 150 (PVC FORCEMAIN)
FORCE MAIN DIAMETER = D = 3 IN
FORCEMAIN LENGTH = L = 20 FT
EQUIVALENT LENGTH OF FITTINGS = 9.8 FT (1)–90° ELBOW (8.1' E.L.), (1)–GATE VALVE (1.7' E.F.)

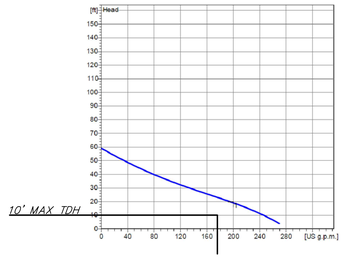
DESIGN PIPE LENGTH = 20 FT + 9.8 FT = 30 FT

FRICTIONAL HEAD LOSS IN FORCE MAIN (HAZEN–WILLIAMS FORMULA):
Hf = 0.002083 x L x (100x Q/C)^1.85 / D^4.8655 = 1.49 FT

TOTAL DYNAMIC HEAD = STATIC + FRICTIONAL = 7.7 + 1.5 ≈ 10 FT

PUMP CALCULATIONS

(310 CMR 15.254)



175 GPM
INSTALL BALL VALVE ON FORCEMAIN TO LIMIT FLOW TO 175 GPM

PUMP CURVE

(310 CMR 15.231)

EFFLUENT PUMPS

1.	NO. OF PUMPS REQUIRED:	TWO
2.	STATIC HEAD:	6.4 FEET/10.3 FEET
3.	TOTAL DYNAMIC HEAD AT FLOW:	8'/17' AT 175 GPM
4.	IMPELLER DIAMETER:	3.94 IN
5.	SOLIDS HANDLING:	2 IN
6.	MANUF./MODEL (OR EQUAL):	HOMA TPM53M38L/2/1
7.	HORSEPOWER/SPEED:	2.5/3450 RPM
8.	VOLTAGE/PHASE:	230/1

CONTROL PANEL

AMPHIDROME CONTROL PANEL TO BE SPECIFIED AND PROVIDED BY F. R. MAHONEY AND ASSOCIATES, INC.

FLOATS

FLOATS AND BRACKETS TO BE SPECIFIED AND PROVIDED BY F. R. MAHONEY AND ASSOCIATES, INC.

PUMP SPECIFICATIONS

(310 CMR 15.231)

AMPHIDROME RECIRCULATION VOLUME:

SYSTEM REQUIRES PERIODIC RECIRCULATION OF EFFLUENT FROM CLEAR WELL INTO AMPHIDROME REACTOR. PER F.R. MAHONEY RECIRCULATION PUMP WILL RUN FOR APPROX 5 MINS AT 120 GPM = 600 GALLONS VOLUME

RECIRCULATION VOLUME = 0.88' DEPTH: 36.32 TO 37.20
(0.88')(13')(7') = 80.08 CUBIC FEET = 600 GALLONS
DOSE VOLUME TO REMAIN BELOW PRIMARY/SECONDARY PUMP OFF SWITCH ELEVATION TO ENSURE RECIRCULATION VOLUME IS ALWAYS AVAILABLE.

PROPOSED LEACH FIELD PUMPING VOLUME

DOSE VOLUME = 632 GALLONS 10 TIMES/ DAY (SEE SHEET 2 FOR CALCULATIONS)

LATERAL VOLUME = 77.5 GALLONS (SEE SHEET 1 FOR CALCULATIONS)

MANIFOLD VOLUME = 2 FIELDS * MANIFOLD LENGTH * X-SEC AREA
= (2)*(80.5')*(π*(6"/12)^2/4) = 31.6 C.F. = 236.5 GAL
FORCEMAIN VOLUME = 2 FIELDS * FORCEMAIN LENGTH * X-SEC AREA
= (2)*(20')*(π*(3"/12)^2/4) = 5.8 C.F. = 43.3 GAL

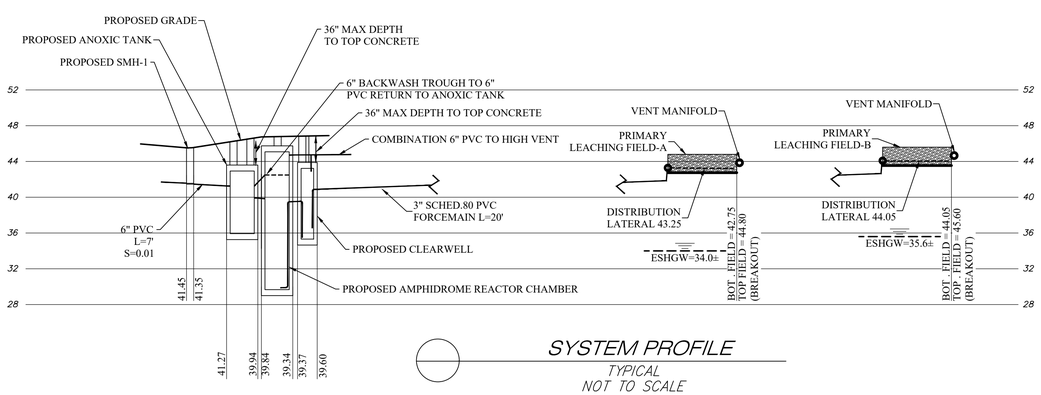
BACKFLOW VOLUME = MANIFOLD VOLUME + FORCEMAIN VOLUME
= 236.5+43.3 = 279.8 => 280 GALLONS

PUMPING VOLUME = DOSE VOLUME + BACKFLOW VOLUME
= 632+280 = 912 GAL

CLEAR WELL INTERNAL AREA: (13')*(7') = 91 SF

PUMP ACTIVATION ELEVATIONS ARE CONTROLLED BY THE AMPHIDROME CONTROL PANEL AND MAY BE ADJUSTED.

SUMP	= 35.32'
BACKWASH VOLUME	= 36.32 TO 37.20 = 0.88' (80 CF = 599 GAL)
PUMP OFF/ALTERNATE	= 37.20'
PUMP ON	= 38.25' (38.25–37.20=1.05', 132 CF = 714 GAL)
ALARM	= 38.80'
LAG PUMP ON	= 38.80'
EMERGENCY STORAGE	ABOVE ALARM = 39.37–38.8 = 0.57' (52 CF = 388 GAL)
TOP CONC.	= 43.90



SYSTEM PROFILE

TYPICAL
NOT TO SCALE

PLAN REFERENCE:

1. EXISTING CONDITIONS TAKEN FROM A DIGITAL FILE NAMED "25887-ORLEANS-PLAZA-EC-WB-2022-05-27.dwg" OF A PLAN TITLED "EXISTING CONDITIONS PLAN", PLAN DATED APRIL 14, 2022. PLAN WAS PREPARED BY HANCOCK ASSOCIATES.
2. PROPOSED BUILDING FOOTPRINTS AND LAYOUT TAKEN FROM A DIGITAL FILES NAMED "230412 NELL WAY 29-UNIT SITE PLAN_APRIL 2023.dwg", "240904 OKH + ZBA PACKAGE.pdf", "D_FIRST FLOOR.dwg", "D_ROOF PLAN.dwg", "D_SECOND & THIRD FLOOR.dwg", "F_FIRST FLOOR.dwg", "F_ROOF PLAN.dwg" and "F_SECOND FLOOR.dwg". PLANS WERE PREPARED BY BLOOM ARCHITECTURE. LAST UPDATED PLANS WERE RECEIVED FROM BLOOM ARCHITECTURE ON SEPTEMBER 10, 2024.

DRAWN BY: CMK/RMD		DESIGNED BY: JTL/RMD
CHECKED BY: JTL/FAK		APPROVED BY: JP

REVISIONS		
4	7/31/25	LEASING OFFICE SPACE ADDED
3	03/21/25	BOH COMMENTS
2	03/03/25	BOH COMMENTS
1	11/15/24	GENERAL REVISIONS
ISSUE	DATE	DESCRIPTION

COMMONWEALTH OF MASSACHUSETTS
JOSEPH D. PEZNOLA
CIVIL
No. 38117
REGISTERED PROFESSIONAL ENGINEER

DATE: 12-18-23

SCALE: NOT TO SCALE

SHEET: SDS-3

17 NELLS WAY

ORLEANS, MASSACHUSETTS

SEWAGE DISPOSAL SYSTEM DETAILS

H.W. Moore ASSOCIATES
CIVIL ENGINEERING | LAND PLANNING
A DIVISION OF HANCOCK SURVEY ASSOCIATES
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Tab: SDS-3 Plot Style: 10SCC.ctb Plotted By: Chris Kwan
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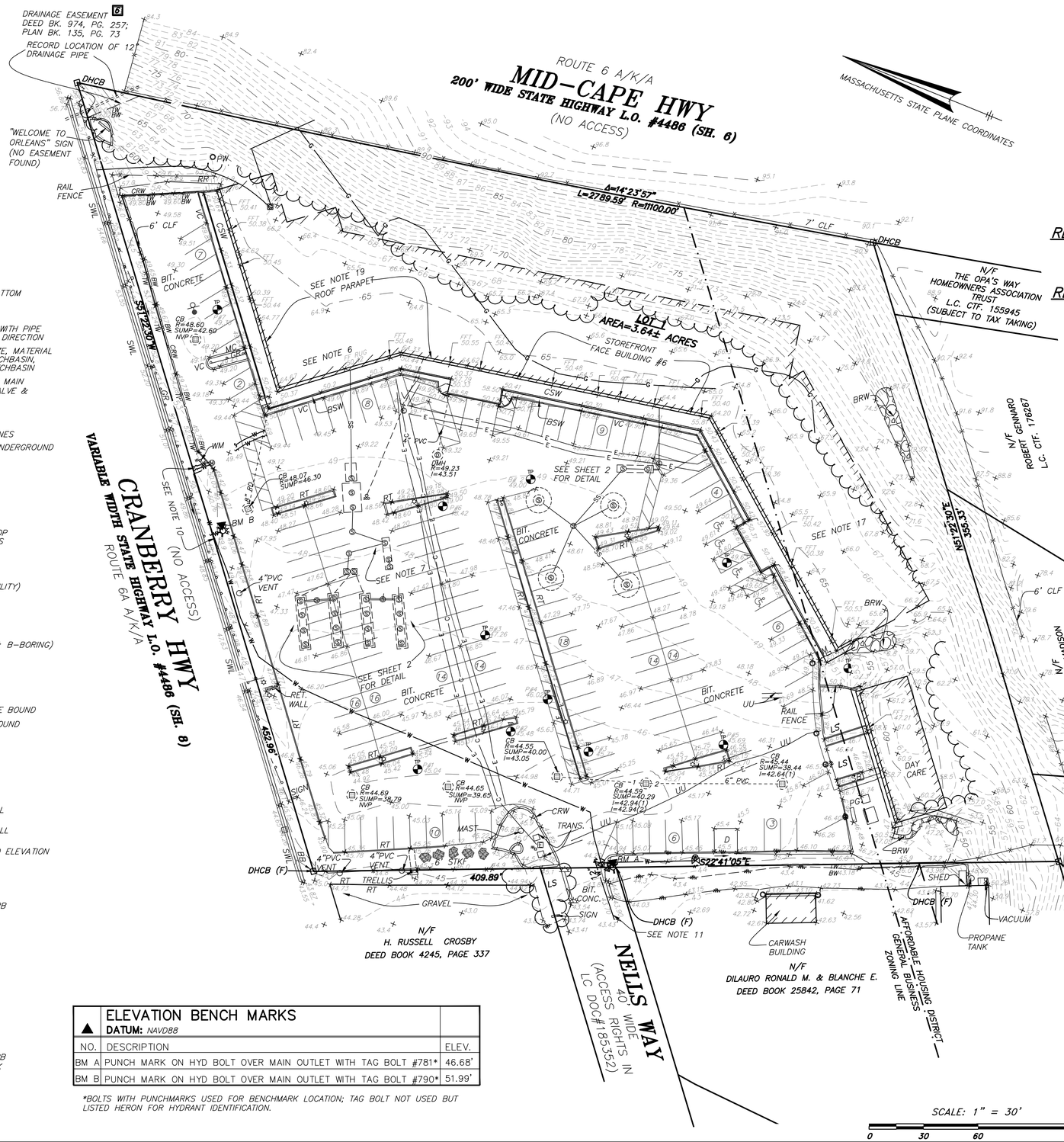


LEGEND

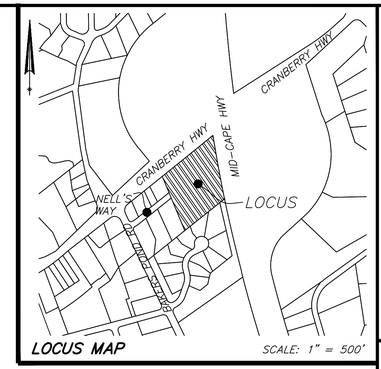
- SURFACE CONTOUR
- METAL GUARDRAIL
- EDGE OF PAVEMENT
- WIRE FENCE
- CURB WITH TOP AND BOTTOM CURB ELEVATION
- EDGE OF WOODED AREA
- SEWERLINE & MANHOLE WITH PIPE SIZE, MATERIAL & FLOW DIRECTION
- DRAINLINE WITH PIPE SIZE, MATERIAL & FLOW DIRECTION, CATCHBASIN, MANHOLE & ROUND CATCHBASIN
- WATER MANHOLE, WATER MAIN WITH SIZE, TEE, GATE VALVE & FIRE HYDRANT
- GAS MAIN WITH SIZE & GATE VALVE
- UNDERGROUND CABLE LINES
- ELECTRIC MANHOLE & UNDERGROUND ELECTRIC LINES
- RETAINING WALL
- HEDGE LINE
- EDGE OF GRAVEL ROAD
- RETAINING WALL WITH TOP AND BOTTOM ELEVATIONS
- BOLLARD
- SIGN
- MANHOLE (UNKNOWN UTILITY)
- TWO LIMBED
- WATER FAUCET
- BASKETBALL HOOP
- TEST PIT/BORING (P-PIT; B-BORING) WITH ELEVATION
- BM — BENCHMARK
- CB — CATCH BASIN
- DH — DRILL HOLE
- DHCB — DRILL HOLE IN CONCRETE BOUND
- DHSB — DRILL HOLE IN STONE BOUND
- DMH — DRAIN MANHOLE
- M — MAILBOX
- SMH — SEWER MANHOLE
- BW — BOTTOM OF WALL
- BSW — BRICK SIDEWALK
- BIT. — BITUMINOUS
- BRW — BOULDER RETAINING WALL
- CLF — CHAIN LINK FENCE
- CRW — CONCRETE RETAINING WALL
- D — DUMPSTER
- FFT — FIRST FLOOR THRESHOLD ELEVATION
- GR — WOOD GARD RAIL
- I — INVERT
- LS — LANDSCAPING
- M — MAIL BOX
- MC — MODIFIED CONCRETE CURB
- NVP — NO VISIBLE PIPE
- PVC — POLYVINYL CHLORIDE
- PW — POST WOOD
- PG — PLAYGROUND
- RR — RIP-RAP
- (R) — RECORD
- (R/H) — RECORD AND HELD
- RD — ROOF DRAIN
- RT — RAIL ROAD TIE CURB
- SWL — SINGLE WHITE LINE
- SB — SANDBOX
- TRANS. — TRANSFORMER
- TW — TOP OF WALL
- VC — VERTICAL CONCRETE CURB
- UU — UNKNOWN UTILITY MARK
- WM — WATER METER

ELEVATION BENCH MARKS

DATUM: *NAVD88*

NO.	DESCRIPTION	ELEV.
BM A	PUNCH MARK ON HYD BOLT OVER MAIN OUTLET WITH TAG BOLT #781*	46.68'
BM B	PUNCH MARK ON HYD BOLT OVER MAIN OUTLET WITH TAG BOLT #790*	51.99'

*BOLTS WITH PUNCHMARKS USED FOR BENCHMARK LOCATION; TAG BOLT NOT USED BUT LISTED HERON FOR HYDRANT IDENTIFICATION.



LOCUS MAP SCALE: 1" = 500'

REFERENCES:

DEED BOOK 34299, PAGE 300
CONFIRMATORY DEED 34402, PAGE 218
PLAN 282 OF 1946

ASSESSORS:

MAP 46, LOT 16

RECORD OWNER:

ORLEANS PLAZA, LLC
103 TERRACE STREET
ROXBURY CROSSING, MA 02120

ZONING:

GENERAL BUSINESS (GB)
AFFORDABLE HOUSING DISTRICT

NOTES:

1) PROJECT SOURCE BENCHMARK IS BASED ON MASSACHUSETTS DOT BENCHMARK ID#8051. THIS BENCHMARK IS DESCRIBED AS A BRASS RIVET SET IN THE NORTHEAST SIDE OF A CIRCULAR CONCRETE FOUNDATION OF A LIGHT POLE. SAID BENCHMARK IS REPORTED TO BE ON THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88) WITH A PURPORTED ELEVATION OF 31.98.

2) UNDERGROUND UTILITIES SHOWN HEREON ARE COMPILED FROM FIELD LOCATIONS OF STRUCTURES AND FROM AVAILABLE RECORD INFORMATION ON FILE AT THE TOWN ENGINEERING OFFICES, TOWN D.P.W., MASS HIGHWAY DEPT. AND UTILITY COMPANIES. OTHER UNDERGROUND UTILITIES MAY EXIST. IT SHALL BE THE RESPONSIBILITY OF THE DESIGN ENGINEER AND THE CONTRACTOR TO VERIFY THE LOCATION, SIZE & ELEVATION OF ALL UTILITIES WITHIN THE AREA OF PROPOSED WORK AND TO CONTACT "DIG-SAFE" AT 8-1-1 AT LEAST 72 HOURS PRIOR TO ANY EXCAVATION, DEMOLITION OR CONSTRUCTION. (SEE ALSO NOTES 8 & 9)

3) THE LOCATION OF UNDERGROUND STORAGE TANKS, IF ANY, ARE UNKNOWN.

4) INTENTIONALLY OMITTED

5) THIS TOPOGRAPHIC SURVEY WAS PREPARED TO MEET NATIONAL MAP ACCURACY STANDARDS AT A SCALE OF 1"=30' HORIZONTALLY AND A 1 FOOT CONTOUR INTERVAL VERTICALLY. ANY REPRODUCTIONS OR RE-SCALING MAY EFFECT THE MAP ACCURACY.

6) INTENTIONALLY OMITTED

7) SEPTIC SYSTEM IS SHOWN PER A COMPILATION OF PLANS ON FILE AT THE ORLEANS BOARD OF HEALTH (BOH) AND FIELD OBSERVATIONS. THE PIPING SHOWN IN THE VICINITY OF "SEE NOTE 7" IS NOT FOUND ON ANY OF THE PLAN COPIES SUPPLIED AT THE BOH BUT IS SURMISED PER FIELD OBSERVATION. IT IS POSSIBLE ONE OF THE FOUR ORIGINAL LEACHING FEATURES MAY STILL BE PARTIALLY FUNCTIONING AND THE SYSTEM MAY RUN FROM THERE TO THE REPAIR SYSTEM. A CAMERA INSPECTION SYSTEM MIGHT BE REQUIRED TO DETERMINE ACTUAL PIPING AND FUNCTION.

8) A 20' WIDE UTILITY EASEMENT THROUGH LOCUS ALONG CABLES, WIRES, CONDUITS ETC., IS FOUND IN DEED BOOK 3855, PAGE 335. NO PLAN OF SAME WAS FOUND; LOCATION UNDETERMINED.

9) ELECTRIC PLAN FROM EVERSOURCE DEPICTS TWO PADS AND ONE MANHOLE IN A DIFFERENT LOCATION THAN FOUND WITH NO UNDERGROUND SERVICE LOCATIONS. SERVICES ADDED ARE FROM GPR 1-27-20.

10) WATER TIE CARDS SHOW A 12" WATER MAIN PARALLEL TO ROUTE 6A AT AN UNKNOWN DISTANCE FROM THE WATER METER AND HYDRANT DEPICTED. NO SERVICES LINES WERE DEPICTED.

11) WATER FEATURES IN AREA OF 12" WATER MAIN IN NELLS WAY ARE APPROXIMATE ONLY AS TIE CARD LACKS COMPLETE INFORMATION. SERVICES WERE NOT SHOWN ON TIE CARD.

12) THE PURPOSE OF THE 2-2-20 REVISION IS TO ADD PARTIAL UTILITY SERVICES ON SITE FROM PREVIOUS CLIENT'S GPR INVESTIGATION ON 1-27-20. SAID UTILITIES ARE NOT COMPLETE AND SOME ARE UNKNOWN (SEE LEGEND-UU). WATER MAIN RUNNING DIAGONALLY ACROSS SOUTHWEST PORTION OF LOCUS IS SHOWN PER AN AVERAGE OF GPR LOCATIONS AND TOWN WATER DEPARTMENT PAINT MARKS AND IS THEREFORE APPROXIMATE.

13) PORTIONS OF THE BUILDING ARE SUBTERRANEAN AND INACCESSIBLE. THESE SECTIONS COULD NOT BE MEASURED ACCURATELY AND DIMENSIONS ARE SHOWN TO THE NEAREST FOOT.

14) THERE ARE NUMEROUS BUILDING RELATED SITE FEATURES INCLUDING BUT NOT LIMITED TO SKYLIGHTS, VENT PIPES, AIR CONDITIONING UNITS, ETC. EXISTING ON THE LAWN/ROOF AREA AND WERE NOT LOCATED PER PREVIOUS CLIENT'S REPRESENTATIVE.

15) UNDERGROUND ELECTRIC CONNECTIONS TO SITE LIGHTING UNKNOWN.

16) ORIGINAL FIELD SURVEY WAS PERFORMED BETWEEN OCTOBER 28, 2019 THROUGH JANUARY 28, 2020. A SITE WALK WAS PERFORMED APRIL 13, 2022 TO VERIFY SITE FEATURES SHOWN HEREON.

SITE ADDRESS:

#17 NELL'S WAY

ORLEANS, MA

PREPARED FOR:

MAPLE HURST BUILDERS, INC

103 TERRACE STREET
ROXBURY CROSSING, MA 02120

HANCOCK ASSOCIATES

Civil Engineers

Land Surveyors

Environmental Consultants

315 Elm Street, Marlborough, MA 01752
Voice (508) 460-1111, Fax (508) 460-1121
www.hancockassociates.com

NO.	BY	APP	DATE	ISSUE/REVISION DESCRIPTION

DATE: 4/14/22 DRAWN BY: CMC/VK
SCALE: 1" = 30' CHECK BY: JDB

EXISTING CONDITIONS PLAN

PLOT DATE: Apr 18, 2022 7:47 am
PATH: G:\Civil 3D Projects\25887 - Maple Hurst Builders - Orleans\Eng\DWG

DWG: XS-25887-ORLEANS-PLAZA-EC-2022
LAYOUT: SH1
SHEET: 1 OF 2

EC

PROJECT NO.: 25887